BULLETIN
OF THE
AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XL 1908. No. 10

THE CLIMATE OF ANCIENT PALESTINE, PART II.*

BY
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TYPES OF EVIDENCE AS TO CHANGES OF CLIMATE.—In the long discussion which has been carried on over the climate of Palestine, many lines of evidence have been brought forward. Three of these have already been referred to as inconclusive, because of the impossibility of distinguishing between the work of man and that of nature, and because human modes of expression are so variable. They may be stated as follows: (1) Biblical and other statements as to meteorological phenomena in ancient times. (2) Statements as to the fertility of the soil. (3) Data as to the kinds of plants growing in Palestine in the past and at present. In the future these lines of evidence will doubtless furnish many important facts. At present research has only gone far enough to show that, while they are not positively inconsistent with the theory of climatic uniformity, they are more readily explicable on the theory of change. Further discussion of them may well be deferred. Certain other lines of evidence will also not be taken up in the present article, because, although the most important of all, they have not yet been made the subject of any investigation by trained observers in Palestine itself. Leaving out, then, the inconclusive and the unstudied lines of evidence, there remain four lines which make it possible to form some fair estimate of the validity of the four climatic hypotheses. These are: (1) The density of the population of Palestine at various periods. (2) The distribution of forests. (3) Ancient migrations, trade-routes and lines of invasion. (4) The distribution, location, and water supply of abandoned ruins.

(1) THE POPULATION OF ANCIENT PALESTINE.—One of the commonest arguments in favor of a change of climate is the former

* Part I, with Map of Syria, in BULLETIN for September, p. 513.

density of population. Taken by itself the argument is inconclusive, but combined with other lines of evidence it is important as will appear in the discussion of deforestation. In Deuteronomy the number of men able to bear arms who came into Palestine is said to have been 603,550, besides women and children. This would mean a total of between two and three million. In David's time the population, according to the census which he took, amounted to between five and six million. Most authorities agree with Hilderscheid, one of the strongest opponents of the theory of climatic change, who says that although these figures may be regarded as "in oriental fashion greatly exaggerated, yet it cannot be doubted that the population of that time was much more numerous and dense than it has now become; and since this population lived almost exclusively by agriculture and cattle-raising, the soil of Palestine must have given much more sustenance than in our day, when it scarcely supports about 600,000 people. That the productivity of the land has diminished notably since ancient times admits of no doubt; the question is, what causes have occasioned this diminution."

The fact of the diminution in the fertility and resources, and, consequently, in the population of Palestine is so patent and well known that it is unnecessary to dwell on it. Only two causes for this state of affairs have been seriously suggested, namely, changes of climate and human folly. Hilderscheid concludes his discussion of the subject thus: "We come to the conclusion that the present poor economic condition and the sparse population are not due to an actual change in natural conditions, but that the sad state in which the land is found at present has been brought about chiefly as the result of historic development; and certainly the hope may be cherished that by a fundamental change in the conditions occasioned by Turkish barbarism, the present barren and unproductive land may again in course of time be able to be brought to a state of culture and prosperity." Many pages have been devoted to the discussion of the possibility of thus restoring Palestine. Almost all writers on the country have something to say about the matter. There is so much opportunity for reasonable diversity of opinion, however, that the discussion is inconclusive, and must remain so, until some other criteria have been found by which it shall be possible to determine beyond question whether there have or have not been changes of climate. If there have been such changes, their influence must first be considered, and then the part played by human folly can be fairly estimated.

(2) DEFORESTATION.—Among the believers in climatic change a

large number attribute the supposed phenomenon to deforestation. They point to the frequent mention of forests in the Old Testament, a fact which certainly suggests a state of affairs quite different from that of to-day. For instance, when the Israelites entered Palestine they appear to have found the country well covered with forests which it was necessary to clear away before they could take possession of the land. In Joshua XVII: 14-18, we read that when the country was divided among the twelve tribes, Ephraim and Manasseh received the central part of the country, the region later known as Samaria. This extends about 40 miles eastward from the Mediterranean Sea to the Jordan River, and some thirty miles northward from Bethel to the plain of Esdraelon. It occupies the very centre of Palestine. The children of Ephraim and of Manasseh complained that the country allotted to them was not large enough. To this Joshua answered: "If thou be a great people, get thee up to the forest, and cut down for thyself there in the land of the Perizzites and of the Rephaim, since the hill-country of Ephraim is too narrow for thee." And the children of Joseph said: "The hill-country is not enough for us; and all the Canaanites that dwell in the land of the valley have chariots of iron, both they who are in Bethshean and its towns, and they who are in the valley of Jezreel." And Joshua answered Ephraim and Manasseh, saying, "Thou art a great people, and hast great power; thou shalt not have one lot only; but the hill-country shall be thine; for though it is a forest, thou shalt cut it down." (*Revised Version.*)

It seems impossible to put any interpretation upon this passage except that when the Israelites invaded Palestine the lowlands were cleared while the central highland was covered with an uninhabited forest, which the new-comers cleared just as the early American colonists, on a vastly larger scale, cleared what is now the eastern United States.

Authors such as Hilderscheid, Ankel, and Conder, however, who do not believe in changes of climate, lay much stress on the fact that the three Hebrew words translated "wood" or "forest" do not necessarily mean exactly what we mean by those terms. Conder (1876: 124) thus sets forth the meaning of the three words used in the Old Testament. The first, "choresh," "does not necessarily imply timber trees, but rather copse or underwood such as still exists." The second, "Jash," usually translated "forest," "might be rendered 'wilderness,' according to the old use of the word. This may be compared with the more dense thickets of lentisk and dwarf-oak, with occasional scattered pines in the high ground, which clothe the western slopes

of the hills. That the amount of this kind of growth has materially decreased and is still decreasing there is no doubt." The third word "etz," applies to timber trees, but does not of necessity mean forest, as it is often used for solitary trees. Conder concludes that "The character of the wooded growth is unchanged. The districts covered by 'wood' [in the sense of thick copse apparently] have on the whole materially decreased."

What Conder and the others say about the various words used for forests is interesting and important, but it gives no clew to the nature of the growth which the invading Israelites were obliged to clear away. The same word may be used in very different senses at different times, or even at one time. We use the word "woods" for a growth of giant trees a hundred feet high and also for a little grove of saplings twenty feet high. Writers on South America use the word "forest" in describing both the Amazon basin and the Gran Chaco farther south in Bolivia and northern Argentina. In the one case, the growth consists of magnificent trees growing so close together that their tops shut out all sunlight. In the other case, the country is covered with typical "savanna." The many ways in which the savanna of eastern Bolivia is described afford an excellent illustration of the variety of phrases which unscientific writers may apply to a mixed growth of trees, scrub and grass in a district which, like Palestine, has a wet and a dry season. "The most accurate descriptions," to quote Bowman, "picture an even stand of tropical and subtropical trees on the banks of the streams and in the adjacent flood-plains. On the much more extensive interfluvial areas the growth is mixed, only isolated trees occurring in wide stretches of open scrub and grass. A river traveller, seeing the forest growth lining the river-bank, gives a description far different from that of the cross-country traveller. The contrasting descriptions, when incorporated in the accounts of those who have never seen the country, are altered somewhat and become still more diverse. The result is a series of very different descriptions, ranging all the way from 'dense forests' to 'prairie.' Two travellers, even when writing of the same route through such a mixed growth, give quite different descriptions, one being impressed by the stream growth, the other by the absence of a continuous stand of trees over the wide interstream areas."

Leaving now the question of the nature of the forests or scrub, as the case may be, which occupied the mountains at the time of Joshua, it appears fairly certain that in its day of greatness Palestine was not a wooded country. Hilderscheid and Ankel point out

that if the population of the Holy Land was formerly so dense as is indicated by the facts stated in a preceding paragraph, it stands to reason that there can have been very little chance for forests, especially as the people were almost entirely agricultural. Whatever trees there may have been originally must have been largely cut off for local use. As Ankel (1887: 122) puts it in reference to the land west of Jordan where the children of Joseph were urged by Joshua to cut off the forest: "For the nearly 4,000 years of the historic past a diminution in the forests west of the Jordan is not proved. On the contrary, one can scarcely climb a mountain peak on which, among the wild bushes, one cannot find traces of old terraces for the location of vineyards and fig-gardens, or of grain-fields; or where there are not winepresses hewn out of the solid rock, banks of stones built up for threshing-floors, primitive cisterns, etc., witnesses of the industry of the former race which knew how to make even the barren ground fruitful. When these works were carried out it is hard to say; but at all events it was at a time when what one in Syria calls 'forests' were restricted to narrower limits than now."

Since forests were of such limited occurrence in the time of the greatest prosperity of Palestine, it is hardly to be supposed that they can have had much effect upon rainfall. It may be added that meteorologists find no ground for believing that forests ever have more than the very slightest effect upon the amount of rainfall, equivalent perhaps to an additional elevation of the land to the amount of one or two hundred feet. They undoubtedly have a vast influence upon the prosperity of a country, for they regulate the rapidity with which the rain runs off and thus prevent floods, ensure the permanence of springs and preserve the general moisture of the soil from one rain to another.

(3) Ancient Routes of Invasion, Migration and Trade—Sinai.—The works of ancient authors contain many accounts of routes of travel which were once much used, but are now abandoned for lack of water and pasture. One of the best known of such routes is that which leads from Palestine to Egypt through the northern part of Sinai. Three thousand years ago it was one of the most important routes in the world. Caravans moved back and forth along it with facility. At the time of the Jewish Patriarchs it was a common thing to go from Syria to Egypt on business. In later days a great commerce was carried on between Egypt, on the one hand, and Syria, Assyria, and Arabia, on the other, all of it passing easily across the peninsula of Sinai. Great armies also followed

the same route. We read again and again of how the Assyrians invaded Egypt or the Egyptians waged war in Syria. Alexander traversed the routes between Palestine and Egypt twice with ease.

To-day all is changed. Practically no one, except the scientific European traveller and a few Beduins, ever crosses the desert from Palestine to Egypt. From a commercial point of view the route is well-nigh impossible. There is so little water and grass that a few caravans would consume it all. If caravans like those of the palmy days of Assyria and Egypt should attempt the route most of their animals would perish. Where the great armies of the ancients marched and counter-marched time and again, the little army of Napoleon in 1799 was almost ruined on the way from St. Jean d'Acre to the Pelusian mouth of the Nile. The Assyrians probably knew somewhat more than the French about methods of travel in dry regions. Nevertheless, it is highly improbable that they can have experienced any such difficulties as those of Napoleon's army. If they had, they scarcely would have made so many expeditions against Egypt. That country could hardly have been so keen a rival of Syria, if the two lands had been separated by deserts so widely as is now the case.

In this same region, three thousand years or more before the days of Napoleon, the great hosts of the Israelites are said to have wandered for forty years on their way from Egypt to the Promised Land. Their number, it will be remembered, is given in the book of Numbers as over 600,000 warriors, besides women and children. The total thus amounts to between two and three million souls, together with all manner of flocks and beasts of burden. For years, so we are told, they wandered in Sinai, sometimes hungry and thirsty, but usually finding enough to eat and drink, both for themselves and their flocks. Time and again the migratory horde came into conflict with powerful tribes of aborigines, such as the Amalekites.

From the biblical account it appears that not only were the Israelites a vast horde, but the peninsula was well peopled. The number of permanent inhabitants must have far exceeded anything that is now possible. At present the total population amounts to only four or five thousand wretched Beduins. The neighbouring regions of the Tih and Arabia Petraea, where once the Edomites and Amorites dwelt, are no better peopled. Always, as Fraas (1878: 27) well says, the hungry Arabs are engaged in fights with one another for grazing grounds or for the scanty springs which alone make life possible. "In consequence of the visit of our caravan to

the camping place of the Beduins" he tells us, in speaking of the expedition of the Duc de Luynes, "the spring of Selaf was exhausted in three days. So the worthy Sheikh Nassar declared to us that dear as his guests were to him, yet before evening we must move our camp to some other place. His tribe already felt the lack of water. Now, in a land which becomes literally exhausted and eaten up through the invasion of only a thousand additional men, can Israel have halted for years? The numerous people of Israel would have used up the whole of the water of the present-day Sinai in a few days. They would have eaten up all the vegetation; and with that all further means of life would have been consumed, even if no native population had existed. Instead of this, we find that the various tribes accomplish their several parts in order; in battle they conquer the aborigines; and, certainly making use of all the wadis, approach as they have been directed to the central stock of the whole mountains, Jebel Horeb or Musa, where the law was announced in the great assembly of the people. Sinai must at that time have been a fruitful Alpine land in all the wadis; the mountains must have been covered with pasturage; to think of a desert like that of to-day is quite impossible. For the desert which the Scripture names one can only understand the salt steppes on the shore of the Red Sea, and to a certain extent also the rocky districts in the mountains, in which the water cannot gather and which therefore form tracts bare of vegetation. To-day the whole peninsula is a desert, and the points on the map where vegetation and the abode of man are indicated almost disappear. Without the assumption of a deep-seated alteration of climate, which has taken place in historic times, leaving out of account the prehistoric, the whole rich and significant story of Sinai remains an inexplicable riddle."

Fraas states the case strongly, but he takes no account of two serious objections which may be raised to his point of view. In the first place, large caravans do sometimes cross Sinai; and, in the second place, it is by no means certain that the Israelites were so numerous as is represented in the Bible, and there are even those who say that the whole story of the exodus is a mere legend. As to the first point, there is no question but that within a few decades large caravans of Mohammedan pilgrims went through Sinai from Egypt to Mecca. In some cases the number of pilgrims is said to have been about 5,000. Their status, however, was entirely different from that of the Israelites. The travellers were all men. They were bound for Mecca on the holy pilgrimage, and were ready and

able to endure hardships which would be absolutely deadly to a migratory horde like the Israelites encumbered with women, children, sheep, and all manner of impediments. Furthermore, the pilgrims merely passed across the peninsula by the shortest line, a distance of 160 miles, which could easily be traversed in ten days. To pass through a land rapidly on camel-back, carrying all necessary provisions, and animated by the hope of eternal salvation as the reward for a few days of hardship is one thing. For a vastly larger body of people to pass through the same land slowly, supporting themselves, their children and their cattle on the produce of the soil, and fighting with hostile aborigines is a wholly different matter.

By far the most serious objection to the conclusion of Fraas as to the former habitability of Sinai is found in the common contention that the biblical narrative is inaccurate. Year by year, however, this objection is losing its force, as discovery after discovery in the field of archæology or history confirms the essential accuracy of the Bible. It may be admitted that many or even most of the details as to the wanderings of the Israelites are inaccurate and that there is much exaggeration. It can scarcely be denied, however, that the story has an historical basis, and that a large body of people, the ancestors of the Jews, came out of the regions known as Sinai, the Tih, and Arabia Petræa and invaded the fertile land of Palestine. The number of invaders may have been multiplied tenfold or twentyfold, but it must have been large. The time of the wanderings may have been ten years or a hundred. All this is immaterial.

The essential fact is that a large body of nomads, starting from Egypt, traversed the Sinaitic peninsula and Arabia Petræa, and finally invaded Palestine. They suffered some hardships, but not a tithe of what any similar body of people would suffer now. They met a large number of inhabitants during the course of their journey, far more than would be met with to-day. The country was then much more densely populated than now, as appears from the abundant ruins of cisterns, terraced fields, houses, villages, and cities upon which every traveller expatiates. The whole agglomeration of circumstances is eminently consistent with the existence of more favorable natural conditions in the past than in the present. It is eminently inconsistent with the present conditions.

In this connection another point needs emphasis. The writers of the biblical narrative and of other ancient documents lived near Sinai; they were familiar with it personally or from the accounts of contemporaries who had traversed the region on business or pleas-

ure. They wrote for men who knew the places mentioned. Under such conditions they could not have falsified their accounts as some modern critics would have us believe. They must have described the country as they and their contemporaries knew it to be. Every modern traveller, almost, has much to say of the hardships of travel in Sinai, and of the impossibility of its supporting multitudes of people. The ancient writers say almost nothing of this. We can scarcely suppose that they were fools or knaves, and therefore we must believe that they described things approximately as they were.

THE SYRIAN DESERT.—The arguments which apply to Sinai apply with equal or greater force to the great Syrian desert. Livingstone (Last Journals: 270) speaks of the great armies which crossed the desert. They apparently did not follow the roundabout route through Aleppo, as most modern caravans do. To-day any other line of march would entail the greatest suffering, but such does not seem to have been the case in the past. At the time of the captivities of Israel prisoners were many times carried to Babylonia, and the route which they followed was apparently across what is now the desert. On this point Livingstone makes a sensible comment. "The prophets," he says, "in telling all the woes and miseries of the captivities, never allude to suffering or perishing by thirst on the way. Had the route to Assyria been then as it is now, they could scarcely have avoided referring to the thirst on the way; but everything else is mentioned except that."

One of the most remarkable features of the commerce of the world during the Roman period and earlier was the great proportion of it conducted in regions where there is now no commerce because the country is too dry. It is beyond the scope of this paper to enlarge on the ancient commerce of Arabia, or to investigate the peculiar fact that Ptolemy describes five rivers there, although now there is not one. The commerce across the Syrian desert, however, was closely connected with Palestine. Up to the end of the first century of the Christian era, the city of Petra, now a magnificent ruin in the midst of the desert, was a great emporium of trade. "Petra," to quote the Encyclopædia Britannica, "was not only safe and well-watered; it lay close to the most important lines of trade. The modern pilgrim road from Damascus to Mecca, which has taken the place of the old incense-route, passes indeed a little to the east by Ma'an. But to touch Petra involves no great detour even on this line, and in ancient times, when Gaza was the great terminus of the Arabian trade, Petra was the place where the Gaza road branched off from that to Bosra, Palmyra and northern Syria. The

route from Egypt to Damascus is also commanded by Petra, and from it too there went a great route direct through the desert to the head of the Persian Gulf. Thus Petra became a centre for all the main lines of overland trade between the East and the West, and it was not till the fall of the Nabatæan kingdom that Palmyra superseded it as the chief emporium of north Arabia."

It is needless to say that all these routes are to-day abandoned. Along the ancient road from Petra to the head of the Gulf of Akaba there are abundant ruins of towns and caravan-serais. Strabo says that in his day, when many Romans were numbered among the inhabitants of the prosperous city of Petra, there was a large mart called Leuce-Come on the east side of the Red Sea near its northern end. To this place, he says, "the camel-traders travel with ease and safety from Petra, and back again, with so large a body of men and camels as to differ in no respect from an army." At present the whole region is desert, the only water is a few poor little springs, and the only inhabitants are Beduin.

Even more remarkable than the road southward from Petra is the one eastward across the Syrian desert to the head of the Persian Gulf. To-day no caravan can possibly cross this desert waste seven or eight hundred miles wide. No explorer, even, appears to have made the journey. The distances from water to water are so great as absolutely to preclude the use of this route. Yet in the past it is spoken of as a great line of trade. Here the work of man can have had little or no effect; nature, not man, appears to have caused the change.

Other routes present the same phenomenon, although in less striking fashion. For instance, there was formerly a great route eastward across the desert from Bosra, although here, too, the desert is now impassable. Even the northern route through Palmyra is to-day largely abandoned. It can, however, still be used in favorable seasons. It is noticeable that the abandonment of the various routes has proceeded regularly from south to north, from the more desert to the less desert regions. Many reasons are assigned for the abandonment of the successive routes. For instance, it is commonly said that the commerce of Petra fell off during the first century of the Christian era because of the establishment of a route from Myos Hormos on the Red Sea to Coptos on the Upper Nile. It is quite as probable that the new route was established because the routes converging at Petra were becoming so dry that caravans began to suffer.

(*To be continued.*)

A GEOGRAPHIC INTERPRETATION OF NEW YORK CITY.

BY

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Compared with many sciences of equal rank and age, geography has but little changed its aim and scope. Beginning as a most inclusive science which dealt with descriptions and observations relating to the entire visible universe, the science has narrowed with the separation from the parent science of geology, meteorology, anthropology, sociology, and phases of other sciences—but still holds rather closely to the meaning expressed by its etymology—earth science. The content of the science has been, and, to a great extent, still remains, the description of the surface of the earth and its peoples, together with any reflections and observations that present themselves to the writer. Perhaps the best efforts of geographers have been given to exploring and mapping the earth's surface, and such work is absolutely a necessary precedent to further description. Such work, although of great value, does not reach its highest value when it remains almost entirely descriptive.

With the general enrichment and increase in the content of all the other sciences, geography has slowly been assuming a new aspect. The facts of location which constituted the principal content of the old geography demand explanation. As a consequence, more attenton is being given to the *relations* of geographic facts and factors. Ritter, Guyot, Ratzel, and many others have given a new outlook by their labors along this line of correlation. Their working definition of geography may be summarized in the statement that geography treats of the earth as the home of man—that is, it considers those earth influences that affect man. The earth in this sense includes the land, the seas, and the atmosphere. Davis would enlarge this definition to include *all* life responses to earth conditions and would add plants and animals to the organic factors of geography.† Mill states the idea somewhat differently by emphasizing geography as the science of distribution, and would include facts of distribution

* A part of the work on this paper was done in a seminar course with Professor J. Paul Goode of the University of Chicago, to whom the author is indebted for suggestions.

† *Geography in the United States*, W. M. Davis; *Science*, Jan. 22, 1904.

not strictly earth-controlled, such, for example, as some governments.*

One concept of geography in preparing this paper is similar to that of Mill. Geography under the conception set forth consists of two great factors, the inorganic and the organic. The inorganic factors to which life must adjust itself divide themselves into three great classes: viz., the position upon the globe, the terrane, and the climate. The organic factors may be divided into three classes—plants, animals and man. The following outline presents the scheme somewhat amplified:

I.—*Inorganic Factors.*

1. Position.
   - Latitude and longitude.
   - Distance and direction.
2. The Terrane.
   - Geological structure.
   - Soils, mineral locations.
   - Relief.
   - Hydrography.
3. Climate.
   - Temperature.
   - Moisture.
   - Winds.

II.—*Organic Factors.*

1. Plants.
2. Animals.
3. Man.
   - Sociological.
   - Economic.

Many of these factors are shared with other sciences, and this is especially true with the organic factors. Duplication and overlapping are inevitable and, of course, desirable in presenting and correlating facts. The test of a geographic fact is the determination as to whether it shows a genetic relation between an earth factor and an organic factor.

The purpose of this paper is to consider the fundamental geographic facts in the growth of New York City. The factors that have not had an important determinative influence have been omitted.

THE POSITION OF NEW YORK.—"An Athenian set down in a modern city would have wondered why they had neglected the best sites."† Athens grew, not at her harbor Piræus, but around a fortified hill several miles distant. Rome flourished not at the mouth of the Tiber, where she would have been accessible to the Mediterranean pirates and maritime marauders, but at a point of greater safety in the interior. Paris grew on an island whose natural moat gave added security, and London began well back from the coast.

* The International Geography, H. R. Mill, 1900, p. 2.

† *Rise of American Cities*, A. B. Hart; *Quar. Jour. Econ.*, 4:129.

The modern city is an expression of factors somewhat different from those of the ancient or mediæval. The factor of easy defence, although not to be neglected, is subordinate to factors of commercial and industrial growth. Easy defence may be influential in determining the *location,* but the subsequent *growth* is determined by the usefulness of the site for commerce and industry. The modern city is a focus of activity for the tributary territory or hinterland.

New York City is what it is, primarily, because of its location, its local hinterland, its relation to other parts of the earth or its larger hinterland, and to social and economic factors, in part geographic and in part independent of geographic conditions.

The city is located at the western border of the narrow Atlantic in the latitude that includes the most active and masterful of the world's people. This latitude insured the peopling of the hinterland with Caucasian folk who had been developing for centuries, and whose previous experience enabled them to continue their civilization in the new land without any serious interruption.

Back of New York the great Atlantic slope stretches to the Rockies; in front, across the Atlantic, the Atlantic slope of Europe faces toward the West, a most important fact.* New York thus is in the zone of greatest activity, commercial and intellectual. As yet the great routes of commerce follow the parallels instead of the meridians, although this condition is not likely to be as persistent in the future as in the past.

The longitude of New York is about 3,000 miles west from the centre of the land hemisphere, a commercial location of some advantage as a medial point between Occidental Europe and the Orient. This advantage, however, is more for the future than it has been for the past.

The problem of distance and direction is one that this port must meet as a candidate for world commerce. The transfer of freight must always be influenced by distance, though the prospect of return cargo, weather, and a host of other factors, may mask the influence of distance. This influence, however, is permanent and counts strongly in the long run.

In distance from Europe, New York has an advantage over most other ports of the Atlantic and Pacific coast, Boston being the only large city more favourably situated on the American seaboard. The sailing distances between London and some American ports are:

* *Politische Geographie der Vereinigten Staaten*, Ratzel, 1893, p. 13.

New York, 3,330 miles; Philadelphia, 3,500 miles; Quebec, 2,850 miles; Boston, 3,200 miles; San Francisco, about 8,000 miles *via* the Isthmus of Panama.

In the competition for world's commerce the distance of New York and London from various ports is shown by the following table, the navigation distance instead of the shortest distance being taken:*

	NEW YORK.	LONDON.
Alexandria	6,503	3,097
Buenos Ayres	9,795	6,298
Capetown	5,142	6,117
Hong Kong	11,580	9,688
Melbourne	12,586	11,055
Rio de Janeiro	4,748	5,204
Shanghai	12,324	10,437
Singapore	10,141	8,248

New York, it will be seen, is one of the most favourably situated cities on the Atlantic seaboard so far as distance from Europe is concerned. So far as European rivals are concerned, New York is favourably situated with regard to South American and Asiatic ports, although not so favourably situated as ports further south on the Atlantic seaboard. This handicap of distance is likely to tell against New York when the Panama Canal shall have been opened.

There have been two interesting investigations dealing with the value of the factor of distance as affecting New York and her great rivals, Philadelphia and Baltimore.

After a period of rate wars between the Baltimore and Ohio, the Pennsylvania, the Erie, and the New York Central for the export trade from Chicago and St. Louis, it was agreed to submit the question of rates to a Board consisting of Messrs. A. G. Thurman, E. B. Washburne, and T. M. Cooley. This board met in 1882 and after hearing testimony awarded a differential rate in favour of Baltimore of three cents per hundredweight and in favour of Philadelphia of two cents. The Board in the report makes the award upon three considerations—distance, cost, and competition. The shortest rail line from Chicago, according to their conclusion, was as follows: Boston, 1,009 miles; New York, 900 miles; Philadelphia, 823 miles; Baltimore, 802 miles—an evident handicap upon New York of eight per cent. with respect to Philadelphia, and eleven per cent. against Boston. At the rates prevailing in 1882, the Commission stated that

* Table of Distances, U. S. Hydrographic Office.

the proposed differential would favour Philadelphia only six and two-thirds per cent. and Baltimore ten per cent. The New York people demurred and claimed that actual cost and not distance should prevail in the consideration.

In respect to cost, the Commission confessed itself unable to decide, owing to a lack of definite statistics. The New York Central claimed advantages of grades, but did not substantiate the claims with facts. The Pennsylvania and Baltimore and Ohio admitted the lower grades of the New York Central but claimed that fuel cost them one-third less.

The Commission found that in 1881 competitive ocean rates to Europe were three cents per hundredweight more for Baltimore and two cents per hundredweight more for Philadelphia. The better facilities at New York for distribution and the greater assurance there of west-bound freight together with the lower ocean rates convinced the Commission that the differential rate was justified. They took no action with respect to Boston, since Boston railroads were not a party to the controversy.* These rates prevailed until 1900, when they were lowered one half in each case. At that time Newport News and Norfolk were included in the Baltimore schedule.

Somewhat earlier a Commission headed by Mr. Hepburn made an exhaustive examination of the question. The testimony fills five volumes and was submitted to the New York Legislature February 28, 1879. The general conclusion was that the differential was unjust to New York and prevented her from enjoying her geographic privileges. Nevertheless, the rates have stood, at least so far as published rates are concerned.

So many factors, geographic and economic, enter into the discussion of the rates in these cases that about the only value of the investigation, so far as this paper is concerned, is to emphasize the favourable position of New York for commerce with Europe. It would seem that the conviction of the Hepburn Commission is in part true. With a car loaded and the train in motion, a distance of one hundred miles is almost inappreciable in the cost of transporting a train load of freight.† The factor of cheap coal is somewhat against New York although the anthracite fields are not distant.

THE LOCAL HINTERLAND.—The history of New York City might be divided into two periods. In the first period the hinterland was

* *Report of the Advisory Commission on Differential Rates; Railroad Gazette*, July 28, 1882, pp. 453-7.

† Report, Hepburn Commission, Vol. V, p. 23. See also, *The Growth of Cities*, A. F. Weber 1905, p. 204.

local and the city was provincial. With the opening of the Erie Canal a new hinterland was opened, and the city became more and more metropolitan. Each hinterland will be separately described, together with its geographic responses. The plan followed will be to begin at the city itself, and describe the various portions of the hinterland with reference to the city as a centre. New York is near

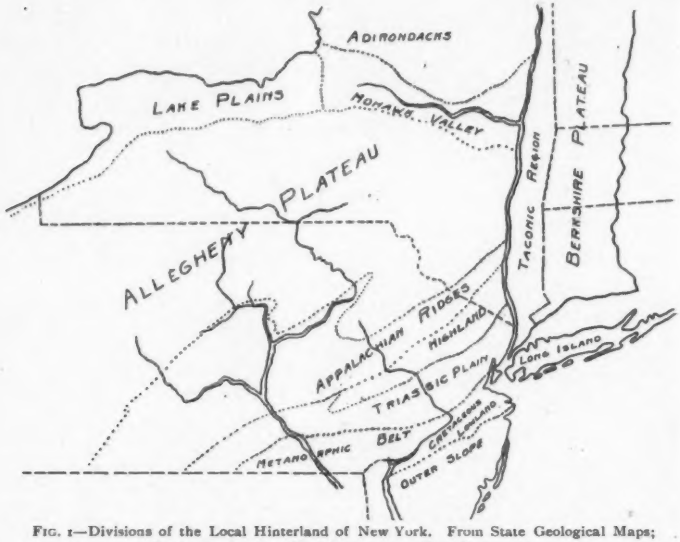

FIG. 1—Divisions of the Local Hinterland of New York. From State Geological Maps; Pennsylvania, 1893; New Jersey, 1901; New York, 1901.

the meeting of several geological formations, each having a characteristic structure and topography. The principal divisions are shown in the map. (Fig. 1.)

THE HIGHLANDS.—The city is built on a complex of partially metamorphosed rocks known as the Highland belt. It is a hilly region for the most part and stands above the country on either side with an average elevation in New Jersey of about 1,000 feet.* It is a well-dissected region with considerable relief, having ridges and uplands from 500 to 1,000 feet higher than the valleys.† There is a sharp contrast between the glaciated and unglaciated portions. In 1888 75% of the glaciated area in the highlands was forested, while south of the glaciated area only about 30% of the area was in

* New Jersey Geological Survey, Vol. IV, 1895, p. 103.
† New Jersey Geological Survey, Vol. I, 1888, p. 134.

forest.* The glacial soils in this province are more stony and less fertile than those of the unglaciated area.† The Highlands extend southwesterly and terminate in the vicinity of Reading, Pa.

THE TRIASSIC PLAIN.—In sharp contrast geologically to the Highlands is the Triassic Plain, lying to the southeast. The plain begins about thirty miles north of New York and extends southwest through Pennsylvania. The rocks are sedimentary, and, in the northern portion, especially, trap has been intruded into the series. The effect of erosion on such a structure has been a relief much less pronounced than that of the Highlands, with the exception of the trap ridges which stand out above the general level, where the trap outcrops. The plain slopes from a general altitude of about two hundred feet on the west to less than one hundred feet on the east.‡ Excepting in the northwest, where the Ramapo Mountains of the Highlands rise above the plain, there is no very sharp topographic division between the Triassic Plain and the Highlands on the northwest and the Coastal Plain on the southeast.§

The soils both on the unglaciated and glaciated portions of the Triassic Plain are in general good.‖ The trap ridges do not yield good soil, but their area is inconsiderable.

THE COASTAL PLAIN.—Beginning in the vicinity of New York, the Coastal Plain widens as it extends southward. The rocks are sedimentary, generally unconsolidated, and dip gently eastward. The combination of soft Cretaceous shales and marls and more resistant overlying formations, both dipping eastward, has, in New Jersey, been eroded into two portions—the inner lowland which is the fertile Cretaceous plain, and the outer slope which is covered with less fertile Tertiary and Pleistocene deposits. The altitude of the inner lowland has a range from tide level to about one hundred and fifty feet, one third of the surface being below fifty feet.** Over one-half of the surface of southern New Jersey is below one hundred feet.†† The Cretaceous inner plain is a fertile region.‡‡ In contrast to the fertility of the inner plain, the outer slope of New Jersey is in general infertile.§§ (Fig. 2.)

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* New Jersey Geological Survey, Annual Report, 1895, p. 101.

† New Jersey Geological Survey, Annual Report, 1898, p. 2.

‡ New Jersey Geological Survey, Vol. I, 1888, p. 152.

§ New Jersey Geological Survey, Vol. IV, 1895, p. 27.

‖ New Jersey Geological Survey, Vol. I, 1888, p. 152. See also the Soil Survey of Trenton Area, 1902. (U. S. Soil Survey.)

** Geological Survey of New Jersey, Vol. I, 1881, p. 169.

†† Geological Survey of New Jersey, Vol. IV, 1895, p. 105.

‡‡ Geological Survey of New Jersey, Vol. IV, 1895, pp. 172–3.

§§ Geological Survey of New Jersey, Vol. I, 1881, pp. 173–8. See also the Soil Survey of the Trenton Area, 1902. (U. S. Soil Survey.)

The eastern slope of New Jersey continues beneath the Atlantic with a gentle slope. Such a shelving sea bottom, together with its unresistant materials, is, in general, unfavourable for the formation of harbours. The shallowness of the water prevents the approach of large vessels. There is a tendency towards the formation of off-shore bars. From Monmouth Beach to Bay Head, a distance of about nineteen miles, the waves are cutting a cliff,* north and south of which are wing-like bars.† The northern wing extends northward and becomes Sandy Hook at the entrance to Raritan Bay.

South of Bay Head is a line of off-shore bars with occasional inlets and with shallow lagoons between the bars and the mainland.

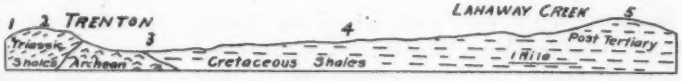

FIG. 2.—Generalized soil section from the vicinity of Trenton, N. J., southwest to the vicinity of Midwood. Soil types: (1) Penn loam, derived from Triassic shales; (2) Sassafras loam, a sedimentary soil here overlying the Triassic shales; (3) Elsinboro fine sand; (4) Collington sandy loam, a fertile soil derived from glauconitic Cretaceous shales; (5) Norfolk sand, a medium to coarse sand sedimentary in origin and infertile. Soil location and description from the U. S. Soil Survey of the Trenton Area, 1902; geology from the geological map of New Jersey, published by the State Geological Survey.

The inlets are difficult of access and some of the channels through them are shifting.‡ In consequence of these unfavourable conditions being where the lowland merges into a highland, the changes are of importance legally and commercially.

The belt between the Appalachian ridges and the Coastal Plain is usually termed the Piedmont. It will be referred to under that name in subsequent pages.

West of the Highlands is a region that has by some been included in the Highland Province. It is lower than the latter, and like it, has a metamorphic structure and hilly topography. Tarr correlates this with the Taconic Region at the northeast, the junction being where the lowland merges into a highland, the difference in altitude being due to the fact that the rocks of the Taconic region are more metamorphosed and therefore more resistant than on the south.§ This province extends along the northeastern border of the State eastward to the Connecticut River, and westward to the Appa-

* Annual Report, New Jersey Geological Survey, 1905, p. 28.

† Shore-line Topography, F. P. Gulliver. *Proc. Am. Acad. Arts and Sciences*, Vol. XXXIV, No. 8, Jan. 1899, p. 213.

‡ Geological Survey of New Jersey, 1905, p. 28.

§ Physical Geography of New York State, 1902, pp. 4-6.

lachian Ridges. Its rocks are highly metamorphosed and its topography, west of the Hudson, is rough. The region in the north has been strongly glaciated, most of the preglacial soil has been removed, and there has not been sufficient time since the glacial period for much new soil to form.

THE APPALACHIAN RIDGES.—West of the Highlands and Taconic belt is the region of folded sedimentary rocks. Beginning near Kingston, N. Y., the folded belt extends to Alabama. Erosion upon the folded structure has left the outcrops of hard rocks standing in relief as ridges, and the outcrops of less resistant rocks cut

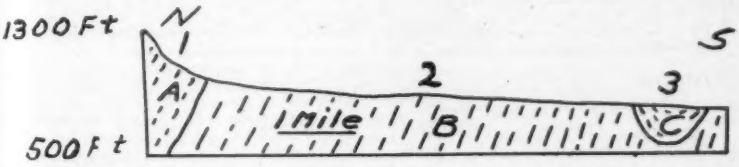

FIG. 3.—Profile and Section in Lower Paxton Township, Dauphin Co., Pa., from Blue Mountain southward. (1) Edgemont stony loam, derived from (A) Oneida-Medina sandstone; a sterile, stony soil on the steep ridge slopes, having only five per cent. under cultivation. (2) Hagerstown shale loam, derived from (B) Hudson River and Utica shales; it is a loamy soil of good quality. (3) Hagerstown loam, derived from (C) Cambro-Silurian limestone; it is a productive soil.

Data from Geological Map of Pennsylvania, 1893; Topographic Map of the Harrisburg Area; and U. S. Soil Survey Report of the Lebanon Area, Pa., 1901.

as valleys. The general result is a system of parallel ridges and valleys with a northeast-southwest trend. The streams in the valleys often turn abruptly and cut transverse gorges across the ridges. The ridges in New York are lower but rise in Pennsylvania to a general level of 1,500 to 1,800 feet, and farther south some of the ridges reach altitudes of over 3,000 feet.* The belt widens in Pennsylvania and in the northeastern part of this State contains one of the richest anthracite coal fields in the world. The soils in the valleys are often fertile, especially where they are residual and derived from shales or limestones. The ridges are infertile. They are usually composed of sandstone, quartzite or conglomerate, to the slow erosion of which they owe their existence, but which weather to a sandy, stony, infertile soil. The steep slopes favor an active drainage which carries away the finer particles and the soil does not retain enough moisture to favor the formation of humus. Figure 3 shows a soil section in the ridge belt of Pennsylvania.

* The Physiography of the United States, 1895, p. 175.

THE ALLEGHENY PLATEAU.—The Appalachian folded strata grade to the west and northwest into the nearly horizontal layers which form the structure of the Allegheny Plateau. This province extends northward to the Mohawk Valley and the Lake Plains, westward at least to central Ohio and southward to Alabama. The

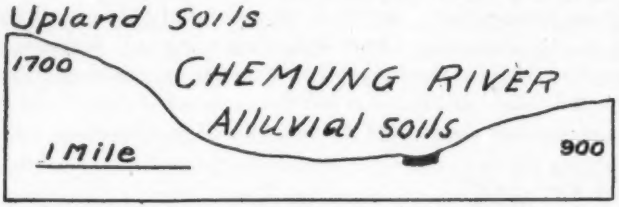

FIG. 4.—Profile of the Chemung River Valley ten miles southeast of Elmira, N. Y. The steep upland slopes are covered with a thin soil derived largely from the underlying Chemung shales. The valley soils are generally fertile. The figures indicate height above sea-level.
From the U. S. Soil Survey Report of the Big Flats, N. Y., Area. 1902.

surface is well dissected, with an average elevation in New York of at least 1,000 feet.* In general the plateau is capped by shales and sandstones. The capping shales and sandstones do not afford a very fertile soil and the glacial till soil in New York is not prominent except in the valleys and on the lowlands. Moreover, as in the Ridge belt, the steep slopes characteristic of the mature dissec-

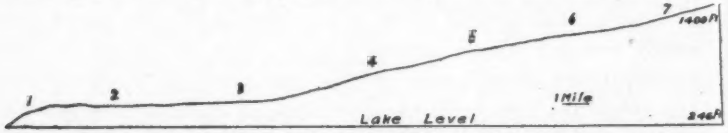

FIG. 5.—Generalized profile and soil section from Lake Ontario to the Allegheny Plateau, across Wayne and Cayuga and into Tompkins Counties, N. Y. Soil types: (1) Elmira silt loam; (2) Alton stony loam; (3) Miami stony loam; (4) Dunkirk clay loam; (5) Dunkirk loam; (6) Miami stony loam; (7) Volusia loam. The Elmira silt loam and the Dunkirk series were deposited in marginal glacial lakes, the most important of which in this locality were the glacial lakes Warren and Iroquois. They are, in general, good soils. The Alton stony loam and the Miami stony loam are derived from weathered drift. They are fair soils. The Volusia loam is largely residual and derived from local shales. The Volusia series are typical soils of the Allegheny Plateau in New York, Pennsylvania and Ohio. In general, the Volusia loam is the least productive of the types shown in this section.
From the following U. S. Soil Survey Reports: Lyons Area, 1902; Auburn Area, 1904; Tompkins County, 1906.

tion of the region do not make for the retention of fine soil particles or the formation of humus. The soils of the upland, which comprise a large percentage of the plateau, are therefore not fertile. They are in sharp contrast to the rather fertile soils of the valleys—a contrast brought out in those Soil Survey reports which include

* Tarr, Physical Geography of New York State, p. 8.

both valleys and uplands.* (Figs. 4, 5.)† This plateau on the east and north presents a dissected escarpment to the Hudson and Mohawk valleys. (Fig. 6.) About sixty miles north of New York the plateau is capped by sandstones and conglomerates. The result of erosion upon this structure is a region of steep-sided hills known as the Catskill Mountains. Further north, in the escarpment south of Albany, a durable layer of limestone overlying softer strata produces the Helderberg Mountains.

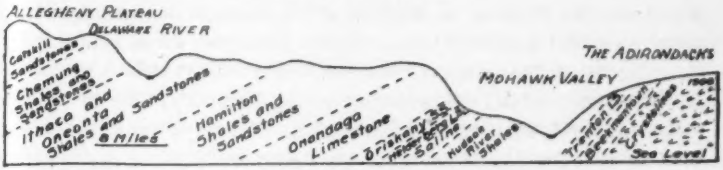

FIG. 6.—Profile and geological section showing: The Mohawk Valley, the Adirondacks on the north and the Allegheny Plateau and its escarpment overlooking the Mohawk Valley on the south. Taken near longitude 74° 60′ about 55 miles from the mouth of the Mohawk.

Profile from the following N. Y. topographic maps of the U. S. Geological Survey: Lassellville, Canajoharie, Richmondville, Hobart, Margaretsville. Geology from the N. Y. State Museum Map, 1901. The dip of the formations is conjectural and greatly exaggerated.

THE MOHAWK VALLEY.—North of the plateau in New York is a lowland belt extending across the State from Lake Erie to the Hudson.

From the Adirondack region, the sedimentary rocks underlying the Allegheny Plateau dip gently southward, lying unconformably upon the crystallines of the Adirondacks. Along the strikes of softer underlying formations, Brigham holds that the ancient Mohawk worked its way westward by headwater erosion.‡

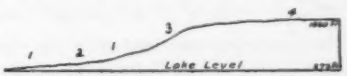

FIG. 7.—Section near Westfield, N.Y., from Lake Erie to the Allegheny Plateau. Soil types: (1) Clays for the most part deposited at the bottom of marginal glacial lakes. (2) Gravel and sand which formed shore lines of the lakes. (3) Residual soil derived from local shales. (4) Morainic soil much of which is derived from local shales.—From the U.S. Soil Survey Report of the Westfield, N.Y., Area, 1901.

This westward advance was arrested at Little Falls by a barrier of crystalline rocks which faulting had brought to the surface. This barrier, according to the same author, served as the preglacial divide between the Mohawk and a westward flowing stream. Later, at the time the drainage of the glacial Lake Iroquois was across this divide, the outflow both corraded the divide and aggraded its channel to the level

* Soil Survey of the Big Flats Area, N. Y., 1902.
† Soil Survey of the Big Flats Area, N. Y., 1901.
‡ Bulletin Geol. Soc. Am., Vol 9, 1898, pp. 183–210.

of the divide, and when the ice finally retreated so as to divert the drainage of Lake Iroquois to the north, the divide and the head of the Mohawk had shifted some ninety miles to the westward, near Rome, and the stream flowed over its level aggraded channel.* The result of this is a trench approximately 1,000 feet deep for much of its length, twelve to twenty miles wide, and about ninety miles in length, extending from the vicinity of Rome to the Hudson near Albany. The bottom of the trench descends from an elevation of about 445 feet at Rome, to sea-level at the Hudson, in a long, gradual slope to within a short distance of the Hudson. (See profile Fig. 6.) North of the valley is the Adirondack region, and south of it is the rather steep escarpment of the Allegheny Plateau. This plateau is a notable feature in New York, but it descends to the westward and in central Ohio it sinks to the general level. (Fig. 6). The soils of the Mohawk Valley are largely of alluvial, lacustrine, and, possibly, in part, of marine origin, and are fertile.

THE LAKE PLAINS.—Extending westward from the Mohawk Valley are the Lake Plains, which consist of three divisions, separated in the western part of the State by escarpments. A low, narrow plain rises 100 to 175 feet from Lake Ontario to the Niagara escarpment. Behind this escarpment, which is about 200 feet high, is the second plain, which extends southward a few miles to a low escarpment made by the resistant Corniferous limestone. The third plain lies further south, and merges into the Allegheny Plateau. These three plains form a series of steps to the plateau. The escarpments become less distinct from west to east, and the two lower plains merge into the Mohawk Valley at the indistinct divide near Rome. These plains were covered by the glacial lakes, Warren and Iroquois.†

The soils of the Lake Plains are varied. The till, largely derived from local limestones and shales, has plentiful mineral plant food. Intermingled with the till, or overlying it, are the shore and bottom deposits of the glacial lakes. The soils are generally fertile. A section through the lower plain up to the plateau shows the soils that are characteristic of the different agencies that have been at work. (Fig. 7; see also Fig. 5.)

THE HUDSON VALLEY.—The Hudson River is really an extension of the Mohawk so far as volume of water is concerned, since

* Brigham. *Ibid.*
H. L. Fairchild, N. Y. State Museum Report, No. 56, Part I, 1902, pp. 30–1.

† Frank Leverett, *Glacial Formations of the Erie and Ohio Basins*, Monograph 41, U. S. G. S., 1901, pp. 68–74.

the former is an insignificant stream until the latter joins it. From the vicinity of Albany southward the Hudson is in a drowned river valley. The valley consists of an outer valley in which the geologically recent gorge-like valley is cut, this gorge being the drowned part.* The tidal influence extends to Troy above Albany. With the exception of the Mohawk, the Hudson has remarkably few and insignificant tributaries, and most of them enter from the west. The divide between the Hudson and the Connecticut, owing probably to the weak and few tributaries of the former and the strong and more numerous tributaries of the latter, is close to the Hudson Valley. There are few interlocking tributaries from the two rivers to form easy passes between the Hudson and the Connecticut valleys. During the glacial advances, the Hudson Valley, extending in the direction of ice movement, was an easy pathway for the ice, and is well scoured. This, together with the steep slopes and absence of any considerable flood plain, gives to the valley but little arable soil.

The Green Mountains and Berkshire Plateau.—Between the Hudson Valley and the Connecticut Valley is a dissected upland, mountainous in the north and hilly in the south. The rocks are largely metamorphic, and in general folded.† The structure is complex, and both the structure and its origin are yet a matter of controversy. The surface rises from the low hills near New York, to the short, sharp ridges west of the northern Hudson Valley. This region was strongly glaciated. The ice erosion swept away the preglacial soil, and at the recession of the ice the surface was partly covered with till. The hardness of the rocks over which the ice moved prevented their comminution by weathering to any extent and the residual till is very bouldery, often containing fifty per cent. of rock (Holyoke stony loam, Fig. 8). Moreover, the resistant rock in the till has not weathered enough in postglacial time to make much of its plant food available. The valleys are narrow

Fig. 8.—Soil section west of Deerfield, Mass. The section shows the change in soil types in passing from the Berkshire Plateau into the Connecticut Valley. (1) Hartford sandy loam of alluvial origin. (2) Triassic stony loam derived from the underlying Triassic sandstone. (3) Holyoke stony loam and rock outcrops. It is underlain, for the most part, by crystalline rocks and consists of stony till which contains 10 to 50 per cent. of boulders. Soil Survey of the Connecticut Valley, 1903.

* Tarr, Physical Geography of New York State, p. 188.

† T. Nelson Dale, *Taconic Physiography*, Bulletin 272, U. S. G. S., 1905, page 26.

and not in a stage mature enough for food plains to form. As in the case of the Allegheny Plateau, the steep slopes do not favor the accumulation of fertile soil. The soil in general in this region is infertile. In an area in the northern part, over seventeen per cent. is rock outcrop.*

LONG ISLAND.—Long Island, although not extensive, is important because of its nearness to New York. In structure it is a part of the Coastal Plain modified by ice. It is a long, narrow, low island, having a kind of double ridge or "backbone" in the northern part. The "backbone" consists of two moraines, the southerly one being the older. South of the older moraine is an extensive outwash plain. (Fig. 9.) The greater part of the island is covered by the sands and gravel of the outwash plains, and the soil has but little plant food.†

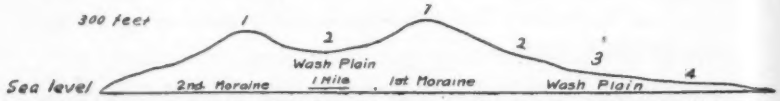

FIG. 9.—Generalized soil section in western Long Island near meridian 73° 20′. Babylon sheet, U. S. Soil Survey of Long Island, 1903. Vertical scale exaggerated about ten times. (1) Alton stony loam, composed largely of morainic sand and gravel with some Cretaceous clay. It is characteristic of the moraines. (2, 3, 4) Sassafras gravelly loam. Norfolk coarse sandy loam and Norfolk sand, respectively. They are characteristic of the outwash plains. The fineness increases from 2 to 4.

CLIMATE.—The States constituting the immediate hinterland of New York have a continental climate, except in the vicinity of the seacoast. The winters are long and severe and the summers short and hot. The precipitation ranges from thirty to fifty inches, and is in general sufficient for those crops which flourish in a region of moderate temperatures. The plains adjoining Lakes Erie and Ontario have a climate modified somewhat by the proximity of large bodies of water. This climatic modification has favoured the fruit orchards and vineyards that have sprung up on the plains overlooking the lakes.

THE RESPONSES TO THE EARLY HINTERLAND. POPULATION AND COMMERCE.—In the early part of the nineteenth century the seaport cities of Baltimore, Philadelphia, and New York turned their attention to the development of the trade in the trans-Allegheny region. The Atlantic slope was well populated in 1790 (Fig. 10), and it was realized that a limit was being approached in the development of the local hinterland. Hitherto the basis of the growth of

* Soil Survey of the Vergennes Area, New York and Vermont, 1904.
† Soil Survey of Long Island, 1903.

cities in America had been that of ancient and mediæval times, namely, the resources of the local hinterland. The commercial supremacy of the coast cities was to be decided by their success in gaining a commercial primacy in the larger hinterland beyond the Allegheny Plateau.

In the matter of a local hinterland, New York was at a disadvantage compared with the seaports to the south. The south-

FIG. 10.—Population map of the United States in 1790. The dotted areas indicate a population of 18 to 45; the lined areas a population of 45 to 90 per square mile.
From the Statistical Atlas, 12th Census.

westward trend of the Appalachian ridges gave a widening belt of Piedmont and Coastal Plain back of the more southerly seaports.* The great Appalachian Valley, with its fertile soil (Fig. 3), also widens in the latitude of Philadelphia and Baltimore, and becomes accessible to those ports through the transverse valleys of the Delaware, Susquehanna, and Potomac. The hinterland of the southerly ports had a climatic advantage in that they could, without much competition, produce tobacco, for which there was a strong European demand. The Susquehanna tapped the territory northwest of New York and led its flour and wheat trade towards Philadelphia and Baltimore. To the fertile Piedmont and Shenan-

* For descriptions of the soils of the Piedmont, see the following U. S. Soil Survey Reports; Adams Co., Pa., 1904; Appomattox Co., Va., 1904; Harford Co., Md., 1901; Cecil Co., Md., 1900.

doah Valley, and to the transverse Susquehanna and Potomac, is undoubtedly due the fact that in the first quarter of the nineteenth century Baltimore was the leading flour market of America, as is shown by the following tables:

*Inspections of wheat flour:**

YEAR.	PHILADELPHIA.	NEW YORK.	BALTIMORE.
1813.....	359,000 bbl.	389,000 bbl.	291,000 bbl.
1815.....	335,000 "	312,000 "	388,000 "
1820.....	400,000 "	267,000 "	577,000 "
1825.....	294,000 "	446,000 "	510,000 "
1827.....	351,000 "	625,000 "	572,000 "

Boston had a well-peopled hinterland, but not the exclusive monopoly of trade which the Hudson and Delaware estuaries gave to New York and Philadelphia.

The productiveness of the local hinterlands is reflected in the wealth and population of the cities to which the hinterlands were tributary. Charleston and Philadelphia were leading centres of wealth and culture and Philadelphia was the metropolis until the early part of the nineteenth century. (Fig. 14.)

Population of:†

YEAR.	NEW YORK.	PHILADELPHIA.	BOSTON.
1722.....	....	...	10,567
1731.....	8,628	12,000	....
1765.....	....	....	15,520
1773.....	21,876	....	....
1790.....	33,131	43,520	18,038
1800.....	60,489	69,403	24,937
1810.....	96,373	99,874	33,250

It is not easy to account for the Colonial leadership of New York in view of its inferior local hinterland. The later growth of the city was probably largely due to the rapid opening to settlement of the Mohawk Valley region—a settlement that had been retarded by the presence of resident Indians. By 1820 a rather dense population extended across the State (Fig. 11). As early as 1795 the Mohawk was canalized, and much of the trade for the population of the valley centered at New York. The Cretaceous lowland and the Piedmont of New Jersey were densely settled, but they were

* Niles' Register, Vol. XXXIV, p. 238.

† Compendium of the Seventh Census, 1854, p. 192.

tributary to Philadelphia as well as to New York. New York was a centre of coastwise trade and by 1815 the enrolled tonnage in the trade in New York State exceeded that of any other State.*

In Colonial times New York and Pennsylvania were rivals in the export trade (Fig. 12), but by 1797 New York State led the Northern States in the value of its exports (Fig. 13). By 1810 New York City had a commerce far in excess of that of Phila-

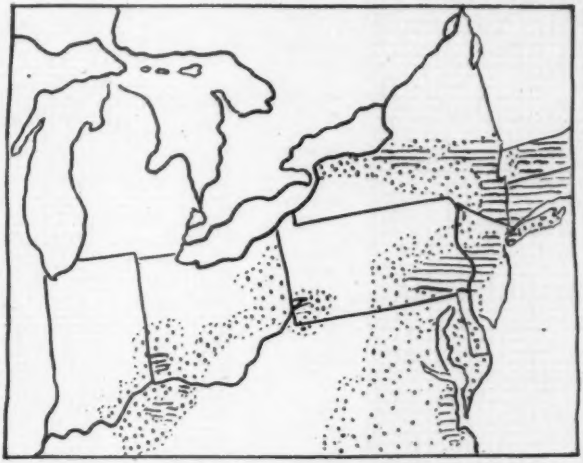

FIG. 11.—Population Map of the United States in 1820. The dotted areas indicate a population of 18 to 45; the lined areas a population of 45 to 90 per square mile. From the Statistical Atlas, 12th Census.

delphia. In the same year the tonnage owned in New York City by far exceeded that of any other American port, being twice that of Philadelphia.†

If we include in the population of the three cities the population within a radius of twenty-five and fifty miles from those cities, the inferiority of the local hinterland of New York becomes evident (Figs. 14, 15, 16). Although the population of Boston city never approached that of New York, the local hinterland of the former exceeded in population that of the latter until 1810. The

* Hazard, Vol. V, p. 77; p. 45.

† Tonnage owned (1810):

New York	268,548.1
Boston	149,121.85
Philadelphia	125,258.15
Baltimore	103,444.69
Charleston	52,388.16

Pitkin, Statistical View of the Commerce of the United States, 1817, p. 430.

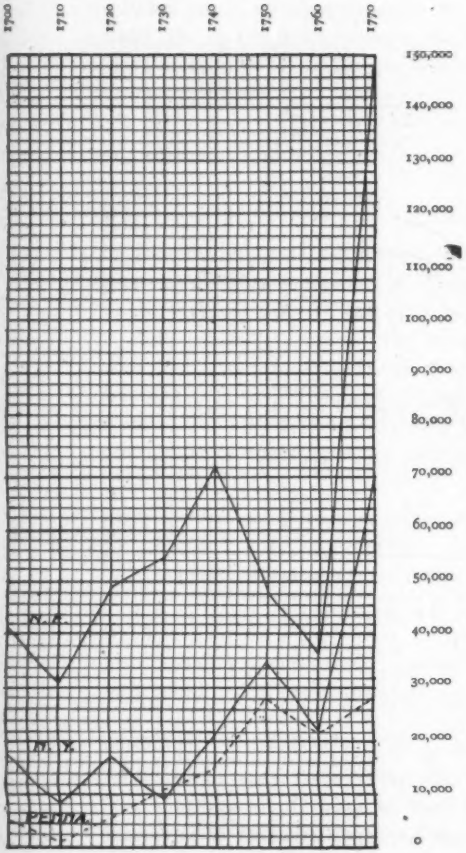

FIG. 12.—Colonial Exports of *New England, New York* and Pennsylvania; values in pounds. Compendium of the 7th Census, page 184.

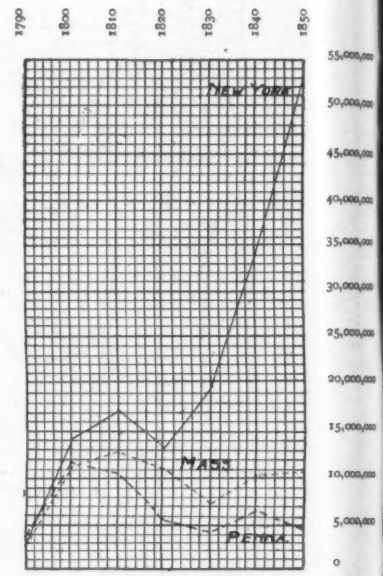

FIG. 13.—Exports of New York, Pennsylvania and Massachusetts (in dollars), 1790–1850. Compendium of the 7th Census, page 187.

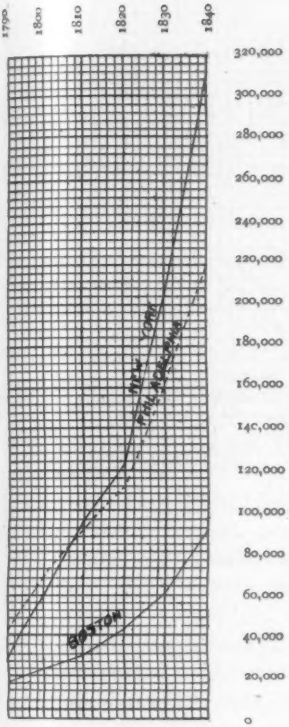

FIG. 14.—Populations of New York, Philadelphia and Boston, 1790 to 1840. *Compendium of the 7th Census, page 192.*

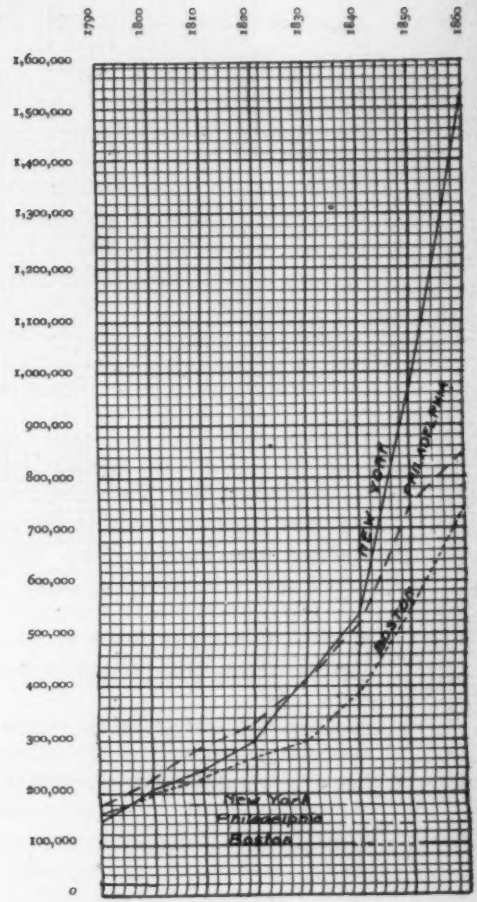

FIG. 15.—Populations of New York, Philadelphia and Boston, including the population of the region within a radius of 25 miles from these cities.

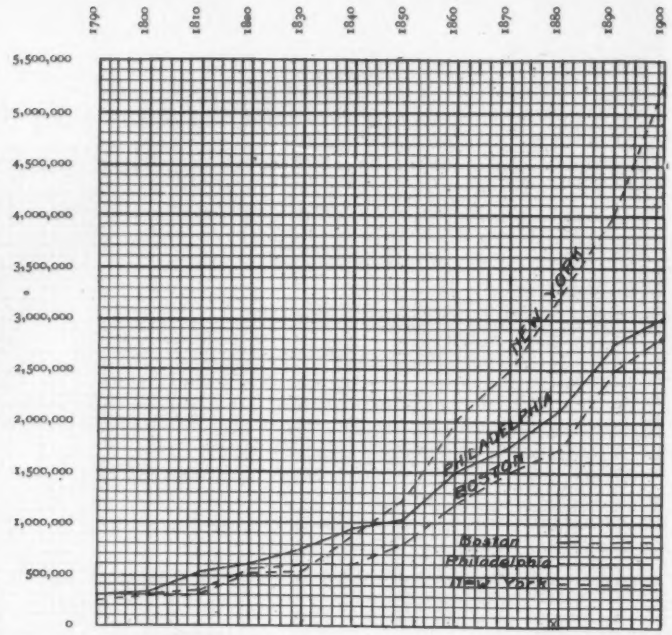

FIG. 16.—Population of New York, Philadelphia and Boston, including the population of the region within a radius of 50 miles from these cities.

graphs tell a similar story in regard to Philadelphia, the population of whose local hinterland exceeded that of New York until about 1840.

The same conclusion is emphasized in a comparison of the agricultural products of the three local hinterlands. Taking the figures from the censuses of 1850 and 1900, the following comparisons appear for a radius of fifty miles from each city:

	TOTAL ACRES IN FARMS.	NO. ACRES IMPROVED.	VALUE OF LAND AND IMPROVEMENTS.	VALUE OF LIVE STOCK.	VALUE OF PRODUCTS NOT FED TO LIVE STOCK.
New York:					
1850.....	....	2,242,682	$154,526,972	....	....
1900.....	3,027,236	2,084,200	147,982,680	$22,134,387	$41,551,802
Philadelphia:					
1850.....	....	3,295,372	219,403,003	....	....
1900.....	4,951,030	3,947,574	218,520,630	37,589,050	68,397,797
Boston:					
1850.....	....	1,563,743	97,185,740	....	....
1900.....	2,588,835	988,807	81,296,400	14,164,423	30,617,432

Owing to changes in the enumeration in the different census reports, the figures given above are valuable chiefly for comparison at the time they were taken. It is to be noticed that the hinterland of Philadelphia, so far back as the census reports go, is more productive than that of Boston or New York. It is reasonable to suppose that these relative values were not very much different in the half century preceding 1850. Roughly speaking, the local hinterland of Philadelphia produces about one-third more in agricultural value than does that of New York. The comparison of the early trade and production of the local hinterland is not satisfactory, because of insufficient data. It would be interesting to trace the influence of each factor in the complex local hinterland of New York upon the development of the city, but this seems impossible to do—at least for Colonial times. The geographic factors, however, that were to influence most effectively the growth of the city, do not come into play until later times, when data are more abundant.

Canal Building.—The factors that located the Colonial ports of New York and Baltimore also directed the energies of those cities to reach the larger hinterland in the Mississippi Valley. The drowned river valleys near or upon which these ports are located, in their upper and middle parts, are transverse valleys across the Appalachian ridges. Back of Baltimore is the Valley of the Potomac; across the Piedmont from Philadelphia, the Susquehanna Valley leads into the Allegheny Plateau; and from New York, the Hudson estuary leads far north of the latitude of the low Appalachian ridges.

The easy passages across the Appalachian ridges are few. While the ridges are often steep and high, it was their number and the width of the ridge belt that made the crossing difficult. The trellised pattern of most of the streams made a zigzag path. When one ridge was crossed the valley beyond must be followed until a wind or water gap gave access to the next valley. It was a difficult journey even for the pioneer and his pack-horse. After the ridge belt was crossed, the Allegheny Plateau, with its early, maturely dissected surface, must be traversed. The valleys were narrow, and often had no flood plain to afford an easy path. The streams were swift and subject to sudden floods. The plateau offered but little inducement to settlers, and, consequently, there were but few places where the traveller could secure supplies.

The feasibility of the Potomac route to the West was noticed

by Washington in 1754 when he was a member of Braddock's army. The route up the Potomac to Cumberland, and from thence northward down the tributaries of the Ohio to that river, became a much-travelled road. As early as 1785 the States of Virginia and Maryland granted a charter to the Potomac Company, allowing it to improve the navigation of that river from tidewater to the highest practicable point, and from this point to construct a canal to Cumberland, Md.* The tolls of the canalized river reached their maximum of annual revenue of $22,542.89 in 1811.† The project was not successful as a revenue producer, nor, of course, in reaching the trade of the West.

The next attempt of the Chesapeake States to reach the West was in 1828, when the Chesapeake and Ohio Canal was begun. The narrow flood plain of the Potomac offered a moderately easy path along which to dig the canal, although frequently rock was met in the digging and tunnelling was necessary. The steep slopes of the streams gave good opportunity for securing water for the canal by a system of dams, which, in the first construction, at least, was less expensive than a system of feeders from tributaries. The distance of the proposed canal to the Ohio Valley was less by more than a hundred miles than the successful Erie Canal.

It was not until 1850, however, that the Chesapeake and Ohio canal reached Cumberland in the heart of the ridge belt. The canal was constructed intermittently, often being delayed for want of funds. The folded structure, with its steep ridges, across which the canal had to pass after it left the Shenandoah Valley, could not support a dense or a productive population. Unlike the Erie Canal, which paid good dividends before it was completed, the Chesapeake and Ohio Canal project could not hope to pay dividends until it reached the Ohio Valley. Its supporters became discouraged at the constant outlay, and by the time the canal in its slow progress had reached the coal fields near the Allegheny Plateau, its competitor, the railroad, had anticipated the canal and secured the bulk of the coal trade which the canal was expected to secure. The canal was dug in the face of great geographic obstacles. Its returns were trifling in proportion to its cost, although the canal did great service in opening up the local hinterland of Baltimore.

Philadelphia had the way to the West pointed out by early wagon

* Milton Reizenstein, The Economic History of the Baltimore & Ohio Railroad, Johns Hopkins University Studies, 1897.

† Report on Canals, 10th Census, Vol. IV.

roads as well as by canals. The rolling Piedmont offered but little obstruction to road building, and the Lancaster pike—a well-built road—early connected Philadelphia with the town of Lancaster, a few miles east of the Susquehanna. The transverse and longitudinal Juniata valleys led to the Allegheny Front, where the ridge topography merges into the plateau topography. When this was crossed, valleys tributary to the Allegheny led down to that river.* Later the Forbes road gave a more direct wagon route across the mountains and plateau to Pittsburg. Along this road Philadelphia sent her drugs, hardware, and dry-goods to the Ohio Valley settlements.† By means of the Cumberland road, Baltimore was securing a large portion of the Pittsburg trade, and in 1791 the "Pennsylvania Society for Promoting the Improvement of Roads and Inland Navigation" made a favourable report on the feasibility of a canal route from Philadelphia to Pittsburg.‡ The report was based on surveys across the State. It was not until 1826, the year after the opening of the Erie Canal, that the Pennsylvania Canal was begun. Although the Schuylkill had been improved so that it was navigable to Reading, it was decided to cross the Piedmont from Philadelphia to Columbia by a railroad.

The physiographic obstacles to canal construction were difficult. The divide near the Allegheny Front was over two thousand feet above the sea-level. The descent westward from this divide was through narrow, steep-sloped valleys. The problem of water supply at the divide was so difficult that a portage railroad was built to connect the eastern and western divisions of the canal. Where the Juniata Valley was longitudinal, the valley was wide, the levels were favourable, and the canal could usually be dug in residual or alluvial materials. Where the valleys were transverse, there were often rapids, and the digging was often in rock. The steep Conemaugh Valley, through which the western division passed, required a large number of locks.

The railroad-canal route was completed in 1834, and Philadelphia was connected with Ohio. The State assumed the expense of construction, which amounted to $14,361,320.32.§ The route had a considerable trade, although it did not, to any great extent, secure the grain trade of the Ohio Valley. The total revenue of the route from 1830 to 1860 was $24,064,591, and the net revenue was

* Semple, E. C., American History and its Geographic Conditions, 1903, p. 65.

† J. B. McMaster, History of the United States, Vol. III, p. 481.

‡ Hulbert, A. B., Great American Canals, Vol. I, 1904.

§ Hepburn Report, Vol. V, pp. 23–4. The cost of construction is given as $16,472,635 in volume IV. Canals, 10th Census, p. 8.

$9,715,777.* It is interesting to note that of the total net revenue, $4,802,419, or about one half, was earned by the eighty-one miles of railroad from Columbia to Philadelphia. The railroad crossed the well-settled and productive Piedmont, whereas the rest of the route, for the most part, crossed the ridge and plateau belt. Before the canal could share in the great iron and coal trade of the State, it had been superseded by the Pennsylvania Railroad, under the control of which it passed in 1857.

The most feasible route to the lands beyond the Appalachian barrier lay back of New York. The Appalachian ridges are low and the belt is narrow a short distance west of the Hudson. The Allegheny Plateau is dissected, and its north-south rivers are transverse to the route westward. But from the tidal Hudson normal, physiographic processes have provided the Mohawk Valley a trench which was of moderate slope (Fig. 17) and partially

FIG. 17.—Profiles of the Potomac River from Georgetown, Md., to Cumberland, Md.; of the Susquehanna–Juniata rivers from Columbia, Pa., to Huntington, Pa.; of the Mohawk River from its mouth to the vicinity of Rome, N. Y. All the diagrams have the same horizontal and vertical scales.

From "Profiles of Rivers in the United States," by Henry Gannett. No. 44 of the Water Supply and Irrigation Papers, U. S. Geological Survey, 1901.

aggraded by the outflowing Iroquois-Mohawk, which drained Lakes Warren and Iroquois. So obvious was the utility of this valley that, as early as 1724, nearly a century before the opening of the Erie Canal, Cadwallader Colden, Surveyor-General of the colony, suggested the possibility of a connection between the Mohawk and some tributary of Lake Ontario.† The plan was later urged by Washington and by Gouverneur Morris. In 1792 the project took more definite shape in the incorporation of two companies, the Western Navigation Company and the Northern Navigation Company—the one to connect the Hudson with Lake Ontario, and the other to connect the same river with Lake Champlain. The people of the State were awake to the importance of the project, and each company was to receive $12,500 from the State as soon as it had invested $25,000.‡

The principal work of the Western Navigation Company was to excavate a canal around Little Falls, where the canal crosses the

*Tenth Census, Vol. IV, Canals, p. 8.

†Poor's Manual, 1881, p. 4.

‡Hulbert, Great American Canals, Vol. II, p. 22.

hard crystalline rock at the old fault line. This canal, 4,725 feet in length, was finished in 1795 at a cost of $50,000.* The company, although it built insecurely and was obliged to expend much of its revenue on repairs, fared better than most of the canal companies of its day. Prior to the Revolution, the Mohawk Valley had been largely under the control of resident Indian tribes, who deterred both travel along that route and settlement of the region (Fig. 10). At this time settlers were entering the territory and in the following two decades it was rapidly settled (Fig. 11). Moreover, the gentle gradient of the Mohawk made it necessary to expend money on but few places, and the canal at Little Falls secured tolls on a large stretch of navigable water. The company actually paid considerable dividends. Meanwhile, a strong agitation had been continued for a canal connecting the Hudson and Lake Erie. It was delayed by the War of 1812, but under the leadership of DeWitt Clinton, the canal was begun by the State in 1818 and completed in 1825.

The geographic conditions were most favourable, and the building of the canal called for much less engineering ability and capital than did its less successful rivals, the Chesapeake and Ohio Canal and the Pennsylvania canals. The principal engineering difficulty was at Cohoes, where the canal drops one hundred and eighty-nine feet to the tidal Hudson, and at Lockport, where it drops sixty feet over the Niagara escarpment to the Ontario plain. East of Little Falls, the aggrading Iroquois-Mohawk had provided a level way, and on the famous Rome level in the old aggraded plain there is a sixty-mile reach without a lock. The alluvial deposits of the Mohawk Valley and the glacial and lacustrine soils of the Ontario plain did not offer notable difficulties in excavation. Indeed, in much of the course the principal difficulty was in removing the tree roots.

The problem of water supply over the summit level, which was such an obstacle to the canals in Maryland and Pennsylvania, was relatively simple in New York. For one hundred and fifty-five miles east of Buffalo the water for the canal comes from Lake Erie; the middle stretch from the Seneca River to Little Falls is fed from the numerous streams that rise in the Allegheny Plateau and flow northward into the Lake plain and upper Mohawk region; and the canal from Little Falls to the Hudson is fed largely from the Mohawk.†

* Hulbert, Great American Canals, Vol. II, p. 36.

† Tenth Census, Vol. IV, Transportation Canals, p. 2.

Considering the magnitude of the operations, the canal was finished with promptness, owing to favourable conditions for construction and also to the ability and vigor with which the enterprise was pursued. The canal cost $6,916,402.47,* or an average of about $20,000 per mile. The favourable physiographic conditions in the construction of the Erie Canal are emphasized by a comparison with its principal rivals:†

	LENGTH.	HEIGHT TO ASCEND.	AVERAGE COST PER MILE IN ROUND NUMBERS.
Erie Canal.....	399	5726	$20,000
Penna. Canals & Railroad.	399	2291	41,000
Penna. Canal, main line..	277	....	30,000
C. & O. Canal.....	184.5	609	60,000

The census maps showed a rapid settlement of the canal zone in the decades 1810-20, especially in the eastern part (Fig. 11). It was in the line of westward movement from New England. The fertile lands were attractive and the navigable Mohawk gave communication. A notable response to these conditions is the promptness with which the canal was utilized. From 1820 to 1825, when the canal was opened, the tolls amounted to $577,616—this, of course, being derived only from local traffic. The sudden magnitude of these local earnings must have surprised even the promoters of the canal.

* Hulbert, Vol. II,, *op. cit.*, pp. 41–72.
† Compiled from Hulbert, Vols. I and II, and Vol. IV, Tenth Census.

(*To be Continued.*)

GEOGRAPHICAL RECORD.

AFRICA.

THE DUKE OF MECKLENBURG'S EXPLORATIONS IN CENTRAL AFRICA.—Early in 1907, Adolf Friedrich, Duke of Mecklenburg, left Germany for German East Africa, to carry out surveys and make zoological, geological, ethnographical and other researches. These labours were very successful and the party has returned to Germany by way of the Congo.

The Duke's scientific assistants were Lieut. Weiss, topographer; Dr. Kirchstein, geologist; Dr. Mildbread, botanist; Dr. Czekanowski, ethnologist; Dr. Schubotz, zoologist; and Dr. von Raven, physician. The starting-point of the exploratory work was Bukoba, the German port on the west coast of Victoria Nyanza, where the Duke and his party arrived on June 9, 1907.

Installments of the Duke's report have, from time to time, been printed in the *Deutsches Kolonialblatt* and other German periodicals. On the way from Bukoba to Lake Kivu, as already mentioned in the BULLETIN, several districts, on or near the Kagera River, were surveyed and a new tributary of the river was discovered. At Lake Kivu a strong surf was noticed on the lake shore each evening, though there was no wind to account for it. It is thought the phenomenon may have some connection with the volcanicity of the region to the north. The flora of the lake and its islands was poor in species, which is in harmony with the idea of its recent origin. The studies of Dr. Kirchstein of the volcanoes north of Lake Kivu led him to conclude that their activity is dying out progressively from east to west.

An interesting excursion was made to the most westerly of these volcanoes, Namlagira, which was ascended by the Duke and several companions. It was the only volcano then in full activity. The route led over a wide lava field due to the eruption of the parasitic crater in 1904. Dr. Kirchstein in his extended researches here saw a number of eruptions from the main crater, which is some three miles in diameter. The eruptive matter consisted of ashes and lapilli accompanied by loud detonations and discharges of gas. He was able to descend a part of the inner crater wall, and discovered, on the south side of the mountain, a series of embryonic volcanoes.

Lieut. Weiss on the way to Lake Kivu made a trigonometrical and topographical survey of the region of the Kagera River; also, a large number of astronomical observations at Kissenye on Lake Kivu and a detailed survey of the region of the volcanoes. The new volcano which originated in May, 1905, near the north end of the lake, was ascended and its position and topography were determined. Dr. Schubotz, the zoologist, obtained some unexpected results, especially as regards the fauna of the Kivu and Kagera waters. *Hirudineae* and *Turbellariae* were seen in great numbers, and *Planariae,* which Stuhlmann had not found in any of the Nile tributaries, were obtained in plenty in the head streams of the Kagera, but not in Kivu. The general poverty of the fauna of this lake points to its recent origin. Traces of elephants, leopards, etc., were found on Mount Karissimbi up to 4,000 meters (over 13,000 feet), while birds were not found above 3,500 meters. The volcanoes form a marked dividing line between the regions on either side, a typical steppe fauna, remarkably rich in antelopes, making its appearance to the north. The BULLETIN has already reported (July, 1908, p. 415) the serious disaster that befell a part of the expedition on Mount Karissimbi in February last, when half of the native assistants lost their lives in a severe snowstorm.

After completing their researches in the neighbourhood of Lake Kivu, the Duke and his party went north in several detachments to Lake Albert Edward, continuing through the Semliki Valley and north along the shores of Albert Nyanza to Mahagi, whence a westward route to the Congo State stations of Kilo and Irumu was taken. Separate expeditions were sent out here and there on one side or the other of the direct route westward. In the little-known forest of Bugoie, east of Lake Kivu, several gorillas had been secured, the first seen by a European in that district. Extraordinary quantities of game were found during the march to Lake Albert Edward on the Ruchuru plain and the zoological collections received important accessions. The buffaloes especially show certain differences from those obtained elsewhere.

From Beni, the important Congolese post in the Semliki Valley, the forest was

penetrated to the west, and its flora proved to be quite different from that hitherto seen. Some of the Monbuttu pygmies acted as guides, and though they had not before been in touch with Europeans, they were quick in taking in new ideas. Another okapi skin was obtained from the Monbuttu dwarfs. In addition to the names *okapi* (or kwapi) and *kenge*, which are most commonly used for the animal, the name *alabi* was also heard. A fine collection of birds was obtained and many specimens of invertebrates and fish from the Ituri, but after the river journey began at Avakubi, the fauna became much scarcer. While at Beni and the districts bordering the forest on the east, the months from February to May are wettest; in the Ituri forest the greatest precipitation is said to occur between August and October.

The scientific work of the expedition was carried on with great energy and the labours of the various experts promise to yield an unusual harvest of results.

Lake Dwellers of Lower Dahomey.—Surgeon-Major Gaillard, who has been studying these Africans, says (*L'Anthropologie*, Vol. XVIII, p. 99) that they do not present many analogies with the inhabitants of aquatic pile dwellings in Malaysia and New Guinea. In some cases the village in the water is opposite one of the same name on the land, and there is evidence in favour of the view that the natives were driven to build on the lake to escape the depredations of the Dahomeyans, who could not cross the water on account of the fetich customs. The lake dwellers are not especially fond of the lake habitations, and during the existing state of political security many have returned to the ordinary agriculture of the district, though still remaining fisher-folk. A large number have built ordinary land houses, but they are accused by those who remain faithful to the pile dwellings of being incapable fishermen. Fishing grounds are free to all. The miserable condition of their houses is due to a lack of forethought and a passion for tobacco and alcohol.

AMERICA.

Recent Explorations in Mammoth Cave.—At the Hanover, N. H., meeting of the American Association for the Advancement of Science in July last, Dr. Horace C. Hovey read a paper before Section E (Geography and Geology), in which he said that explorations in the unfrequented parts of Mammoth Cave have, in the past few years, been pushed by several visitors, especially by Messrs. Parish and Einbigler, aided by the local guides. The results were laid before Dr. Hovey who verified them by a personal visit in 1907. He found the newly discovered domes to be grander than any previously known. These additions and a number of minor corrections had led him to prepare a new guide map with an index and table of approximate distances which he had now published.

Deep Artesian Well in South Dakota.—One of the Government geologists last year informed a railroad company owning land at Edgemont in the Black Hills region of South Dakota that his study of the rock strata had convinced him that a good supply of water existed at a depth of about 3,000 feet. For many months the company, on the strength of this opinion, has been sinking a bore on its land. When the drill reached 2,980 feet water began to gush out at the rate of 350 gallons a minute. Such determinations of underground conditions are not now uncommon. Extensive areas have thus been

mapped underground by the Geological Survey and the maps have been accompanied by definite descriptions of the character and age of the different strata. The great Dakota Artesian Basin, which extends over an enormous area, has been accurately mapped, as well as many smaller but hardly less important basins.

MONEY FOR SURVEY WORK.—The appropriation in the Sundry Civil Bill for the Geological Survey to be expended during the fiscal year 1908-09 amounts to $1,335,520. The purposes for which the larger part of the money is to be expended are: topographic surveys, $300,000; geologic surveys, $200,000; fuel-testing investigations, $250,000; printing and engraving geologic maps, $100,000; exploration of water resources, $100,000; investigation of structural materials, $100,000; and the *Reports* on mineral resources and Forest Reserve topographic surveys, $75,000 each.

PLANTING TREES.—A good beginning has already been made in our country towards the wholesale tree planting that is so common in Germany, France, and some other countries. The *Forestry Quarterly* (No. 3, 1908) prints considerable information on tree planting carried out during the past season, largely by private interests. The Pennsylvania Railroad Company planted 303,030 trees. This company has in its nursery at Norrisville, Pa., 1,500,000 seedlings (walnuts, oaks, etc.) that will be suitable for field planting next spring. The Remington-Martin Co., one of the largest paper manufacturing concerns, has begun reforesting its lands and has already planted over 500,000 trees. For three years Mr. John Cole, a large landowner in the southern Adirondacks, has been replanting his lands with three-year-old white pines imported from Germany. The Gloversville Waterworks planted last spring 15,000 white and 5,000 Scotch pines and have also started seed beds. Many other companies whose names are given expect to plant largely next year. The Forest, Fish, and Game Commission has purchased eight acres of land at Salamanca, N. Y., and started 50 seed beds to raise trees for distribution to those who wish to plant land in New York State. The trees will be sold at the cost of production, about $3.75 per thousand, the purpose being to encourage planting on the part of private owners.

WEATHER INFLUENCES PRECEDING THE EVACUATION OF BOSTON.—That weather conditions have very often been the determining control in important historical events is evidenced by very numerous examples, but little attention has thus far been paid to this subject. A contribution to this study of past weather in relation to history, by Walter N. Lacy, is published in the *Monthly Weather Review* for May, 1908, under the title, "Weather Influences Preceding the Evacuation of Boston, Mass." The writer has made a careful study of all available data of the local weather conditions at the time, and has constructed a series of four weather maps, showing the probable distribution of pressure, winds and weather on March 4-6, 1776. It appears that the Americans were favoured, during their fortification of Dorchester Heights, by smoke and fog, which kept the British from any suspicion of what Washington's men were doing, while a southwest wind carried any sounds of the American operations out toward the bay, away from the city. When the British fleet sailed to attack the fortifications, a furious southeast wind, probably produced by a marked low pressure area central in New York State, drove three of the transports ashore on Governor's Island, in Boston Harbour. The same night and the

following day torrents of rain fell, with a high southeast wind, which made it impossible for the British to land on the Dorchester shore. When the storm and surf had subsided, sufficiently for the British to attack, the American position, which had been further fortified during the storm, proved too strong to be carried, and the evacuation of Boston was decided upon. Gen. Washington's letter to Major-General Lee, on March 14, 1776, read as follows: "A very heavy storm of wind and rain frustrated their (*i. e.*, the British) design." Many studies of the kind so successfully made by Mr. Lacy are suggested by this paper.

R. DEC. W.

REPORT ON THE CLIMATE AND WEATHER OF BALTIMORE AND VICINITY.—By Oliver L. Fassig. Maryland Weather Service. Vol. 2. 4to. Baltimore: The Johns Hopkins Press, 1907. Pp. 515, Pls. XXIV., figs. 170.

We have already noted, in this BULLETIN, the appearance of two previous publications of the Maryland Weather Service dealing with the climate of Baltimore. In 1904 there was issued Part Ia, of Vol. II (pressure and temperature). In 1905 came Part Ib (humidity, precipitation, sunshine and cloudiness, winds and electrical phenomena). Now we have the complete volume, in which Parts Ia and Ib are included, together with 200 new pages on the *weather* of Baltimore. We have already pointed out that this admirable report by Dr. Fassig is the most complete and most scientific climatographic account which has been issued in this country. The portion which concerns the *weather* is fully up to the high standard of the earlier portions already published on the *climate*. Dr. Fassig has selected his weather types with care, and has illustrated them by means of a very liberal use of excellent coloured charts and of diagrams.

This is the first complete discussion of the matter of weather types, fully illustrated, for any part of the United States. For New England, some years ago, Professor W. M. Davis wrote an account, which was a pioneer along the line now followed by Dr. Fassig, but Professor Davis did not illustrate his monograph, nor did that study make any claim to be exhaustive. A few other discussions of weather types, for this or that station, have been published since then. In the *Report of the Eighth International Geographic Congress* (Washington), R. DeC. Ward urged that emphasis be laid on the cyclonic and anticyclonic units in any study of climatology, and gave an account of the thermograph and barograph curves which he had found useful in his teaching at Harvard University. Dr. Fassig has taken a long step along the line of this rational presentation of climatology. His carefully selected maps and diagrams, and his clear presentation of the results of his investigation will, it is to be hoped, serve as a model for many other studies along similar lines for other parts of the United States. To Dr. Fassig belongs the high credit of having completed a very laborious, but very valuable piece of work.

R. DEC. W.

EARTH MOVEMENTS IN THE CALIFORNIA EARTHQUAKE OF 1906.—The United States Coast Survey, previous to 1906, had done much careful triangulation in California; and since the evidence was clear that there had been horizontal movements of from 7 to 20 feet in connection with the earthquake of 1906, it became important to review these earlier triangulations to find out what

corrections were necessary. This has been done, and in connection with it some very interesting and important scientific results have been obtained, which are now published by John F. Hayford and A. L. Baldwin (*Report Coast and Geodetic Survey* for 1907, Appendix No. 3, pp. 67-104). By this new triangulation it was discovered that there had been movements not only in 1906, but, what was hitherto entirely unexpected, at an earlier period, probably during the earthquake of 1868. These two great displacements affected an area of at least 4,000 square miles.

Most of the report is concerned with a detailed statement of the methods employed in obtaining the results, and a careful analysis of the evidence of horizontal shifting as deduced from a relocation of the triangulation stations. Among the noteworthy results of this study it is found that

During the earthquake of 1868, or about that time, about 1,000 square miles of the earth's crust were permanently displaced to the northward about 1.6 meters (5.2 feet).

During the earthquake of April 18, 1906, displaced points on opposite sides of the great fault moved in opposite directions, and essentially parallel to the fault. Points to the east of the fault moved in a southerly direction, points to the west in a northerly direction. The displacements decrease in amount away from the fault.

The combined effects of the earthquakes of 1868 and 1906 have increased the distance between Mount Tamalpais and Black Mountain by 3 meters (10 feet). The distance is 79 kilometers (49 miles) and the increase is, therefore, one part in 26,000. The Golden Gate lies between these two stations It is interesting to note that the length of part of the Pacific coast, including the Golden Gate, has been increased, just as the distance across Monterey Bay has been increased.

There has been

no change of elevation of sufficient magnitude to be detected with certainty.

The significance of such changes has important bearing not only upon geological study but upon human affairs, in various directions, and is therefore a matter of great geographical interest. R. S. T.

Dr. E. O. Hovey's Description of Mount Colima.—In a valuable article on "Mountain Climbing in Mexico" (*The Outing Magazine*, October, 1908), Dr. E. O. Hovey gives an account of his ascent of Mount Colima and an interesting description of this little known though prominent volcano. He says:

The little mountain group known as Colima comprises two great peaks, the northern, and more extensive and massive of which is the ancient volcanic pile called the Nevado de Colima. The culminating point of the Nevado is 14,361 feet above the sea, according to the latest determinations of the Mexican geologists. From the north it presents a striking resemblance to the Matterhorn, reversed, but from the south the likeness is not so clear. The lower slopes of the mountain are covered with a heavy forest, many of the trees being of enormous size, and the wealth of air plants of many kinds, including some orchids and two kinds of cactus, arouse the interest and admiration of the traveller. One zone of vegetation after another is traversed on the way up the mountain, until, at an elevation of 10,000 feet and upward to 13,000 feet, the woods are made up of practically nothing but pine trees. Above 13,000 feet there were no trees, partly, no doubt, on account of the rocky, precipitous character of the pinnacle forming the summit of the mountain. Snow lies on the upper part of the mountain much of the year. Here and there we saw the little, square stone-walled pits in the ground in which the snow is compressed by the peons into an icy cake, which is taken to Zapotlan for sale.

The southern peak of the Colima group is the Volcán de Colima, the apex of which is 1,700 feet lower than the summit of the Nevado, and is tenth in the list of Mexico's mountains. This volcano is a constant menace to the surrounding country, according to the opinions of the inhabitants of the vicinity. Steam always rises from the summit in greater or less volume, but great eruptions have not occurred more frequently than once in sixteen or eighteen years. After a long period of quiet there was a heavy outburst in 1851, followed by others in 1869, 1885 and 1903. The eruption of 1869 seems to have been the most severe of those of recent years.

ASIA.

DR. SVEN HEDIN'S RETURN FROM TIBET.—This explorer returned to the hill town of Simla, in northern India, in September, on his way home to Europe. When he reached Gartok, in southwestern Tibet, late last year, he announced his intention to go north to the district of Ladakh, in eastern Kashmir, for the purpose of taking home those of his men who lived in that region. He would spend the winter there and in the spring would start for Peking through Chinese Turkestan or go south to India.

This, however, was not his real purpose, for he intended to make a third long journey in Western Tibet. His alleged plans were announced merely to throw the Tibetans off the track, for they were watching him closely and meant to prevent him from travelling any longer in their country. His ruse succeeded, and his third series of explorations in Tibet since he resumed his labours in Asia in August, 1906, again illustrates his remarkable endurance and unfailing resource.

His two earlier journeys may be briefly summarized: As the Indian Government forbade him to enter Tibet, he fitted out a caravan in Ladakh, in 1906, ostensibly for explorations in Chinese Turkestan, crossed the border of that country into the extreme northwestern corner of Tibet at the Aksai Chin or White Desert, explored the unknown triangular tract between the routes of Wellby, Bower and De Rhins, discovered new mountains and many fresh- and salt-water lakes, obtained further proof of the wide distribution of gold on the plateau, crossed the whole of western Tibet in a southeasterly direction, and arrived at Shigatse, on the Brahmaputra, on February 22, 1907.

A little later, he started westward through southern Tibet, with long detours to the north and south, crossing several times the great mountain range Nin-Chen-Thang, which he had discovered on his first journey and now found to extend clear across southwestern Tibet. He also discovered and examined the sources of the Brahmaputra, Indus and Sutlej rivers and, late last year, reached Gartok in the extreme western part of Tibet.

Dr. Hedin's third journey cannot yet be fully described, but a despatch to the London *Times* (weekly Edition, No. 1655), dated "Simla, Sept. 16," gives an outline of this work. A fresh caravan was organized at Leh, consisting of 11 men with 40 animals and three-months' provisions. The party started north on December 4, last year, and when within two days of the Karakoram Pass turned due east. It crossed into Tibet at Aksai Chin, in spite of great difficulties, for the weather was severe, snow fell continuously and the animals began to die. The lowest temperature —39.8° (Cent.) was registered on January 15. Dr. Hedin's feet were frost-bitten and all the sheep taken for food died. Finally, the expedition reached Shementso, aided by friendly nomad hunters, who supplied some antelope and sheep. No other sign of life had been seen for sixty-four days.

In the next march of twenty days to the east-southeast, passing Lake Lemchang, gold fields were seen, with channels for gold washing, and evidence that in the summer months, the industry is conducted on a fairly large scale between latitudes 32° and 34°.

Thus far the country had been revealed to some extent by earlier explorations, but the way ahead was in the unknown. Danger from Tibetans was increasing, and so the explorer assumed the guise of a common Ladakhi, stained his hands and face, and, when nomads were met, drove the baggage and sheep as a servant of the nominal head of the caravan, Abdul Karim, a trustworthy

man, familiar with Tibet. The observation instruments and money were hidden in bags of rice. The appearance of Ladakhis there in winter aroused suspicion, which the party lulled, as far as possible, by pretending to be the agents of a Ladakh chief who wished to buy wool in summer and to send thousands of sheep to the grazing grounds.

At Lake Tong (Tongtso), just north of latitude 32°, Dr. Sven Hedin reached the point where his earlier route and those of Littledale and Nain Singh crossed, and he thus established fresh connection with earlier mapping. He had now reached the northern edge of the great unknown tract between 30° and 32° N. Lat. After travelling east for some time, he turned due south, crossing several ranges running east and west. The nomads supplied him with food and he passed the enormous ice mountain Shakangsham, the source of a large river, on the east, travelled over the Ladang Pass and entered the Bongba province, which no European had ever seen and whose name was scarcely known.

He discovered Lake Chunitso and followed its west shore for a day. He saw caravans of sheep carrying salt and first heard of the great salt lake Tabia Tsakha, which is a source of considerable wealth to the Government, the salt being exported in large quantities to the east and south. Two more ranges were crossed, and then the open plain was reached bounded southward by the great range of the Nin-Chen-Thang, which is the grandest physical feature north of the Brahmaputra Valley. Snow and glaciers everywhere bounded the horizon. The pass through this range, called Samyela, 18,000 feet, gave approach to the watershed between central Tibet and the Brahmaputra. This was the eighth time that the explorer crossed this range at various points.

The last important piece of discovery was the solution of the problem of the Charta-Sangpo, a large tributary of the Brahmaputra, reaching it from the north. Its hypothetical mapping was found to be very inaccurate. The Charta flows from a lake that is fed by great snow peaks.

Expansion of Shanghai.—The constant expansion of the port during 1907 was the most noticeable feature of the year. During no other period were so many important architectural works begun or completed, or so many blocks of time-honoured buildings demolished to provide space for modern structures. A bold innovation is the construction of enormous edifices entirely in reinforced concrete. The godown accommodation, which a few years ago was insufficient to meet the demands of trade, has been largely supplemented and is now more than ample for existing requirements.

Another feature of the times is the increasing linguistic proficiency of the Chinese. "Pidgin" English is falling into disuse; and the native acquires French, German, and English, spoken and written, with comparative ease, and in this accomplishment suffers nothing by comparison with his Japanese rival. The foreign trader finds it necessary to do more in the same direction, and the Chinese language is in consequence being studied by Europeans to a much greater extent than formerly. (*China. Imperial Maritime Customs, Statistical series, Nos. 3 and 4, 1907.*)

EUROPE.

A Canal Through an Island in the Elbe.—A canal of the width of rather more than 1,000 feet is to be constructed through the island of Mühlenwerder, in

the Elbe, where the Mühlenfeut joins the river, by which Hamburg will be enabled to use a considerable part of the island for future harbour construction, and to leave the waterway from the mouth of the Elbe to Harburg independent of Hamburg's shipping. Hamburg will, in consequence, be able to construct harbour basins independent of the part of the Elbe belonging to Prussia. The deepening and widening of the lower portion of the Elbe in 1896 resulted in the river being available for the increasing traffic and the larger dimensions of the vessels, but the improvements then made are no longer sufficient; hence the present proposal, the cost of the carrying out of which is estimated at £6,000,000. (*Nature*, No. 2028, p. 468.)

THE SCANDINAVIAN DIVIDE.—The main divide of the Scandinavian peninsula does not extend in irregular fashion, but in a series of scollops, with the convexity to the south and east. In a recent paper Prof. Reusch (*Norsk Geologisk Tidsskrift*, Bind 1, No. 1), explains this peculiarity as a result of the fact that the west-flowing streams have greater power than those flowing eastward. That this is to be expected is clear from the fact that the west-flowing streams have both a steeper slope and a greater water supply. Thus, having more energy, they are pushing their divides backwards into the drainage area of the east-flowing streams. If such is the case, instances of river piracy should be found, and a part of Prof. Reusch's paper is devoted to a statement of the evidence of this. He shows that there are a number of instances of what he calls "hook-valleys," which in American physiographic literature are known as barbed tributaries; that is, tributaries entering in an upstream direction, instead of pointing downstream as is normal.

R. S. T.

A NORWEGIAN LANDSLIDE.—Landslides in their relation to life are usually of destructive character. This is well illustrated by the landslide of January 15, 1905,* in Nordfjord, north of Bergen in Norway, recently described by Prof. Reusch (*Norges Geologiske undersögeles Aarbog*, 1907, No. 3). A huge mass of rock, estimated to be 100 meters high and 10 meters thick, together with a still greater mass of moraine, slid bodily down the mountain, a large part of it entering Loen Lake. This gave rise to a great wave, which at one point swept to a height of over 40 meters. A steamer, drawn up on the shore for the winter, was washed a distance of 250 meters, coming to rest at a distance of 218 meters from the lake. Here the water rose 25 meters, stripping the earth and vegetation from the promontory. At the village of Bodal, where the water rose 10 meters, the lower buildings were all destroyed and 26 persons lost their lives, while at Nesdal 34 persons were killed. The isolation of the inhabitants of a Norwegian fiord is clearly and somewhat pathetically stated in the concluding sentences of Professor Reusch's English summary. He says: "Several circumstances made it difficult to bring the poor people such quick assistance as was needed. All the boats along the lake but one were destroyed. There is no road, with the exception of a difficult path, and the following day a heavy gale having sprung up, part of the path was covered with an avalanche of snow."

R. S. T.

CLIMATE OF DAVOS.—Davos has long been well known as a health resort, and the special advantages of its climate have been very generally praised. Dr. Hugo

* See the abstract of Mr. A. P. Brigham's paper in BULLETIN for 1906, p. 86.

Bach has recently issued a report on the climate of Davos (*Neue Denkschriften der Schweizerischen Naturforschenden Gesellschaft*, Bd. 43, I). The valley is well sheltered from the wind, and calms are frequent. The cloudiness, which is at a minimum in winter, is small when compared with that on the lowlands, or with that on mountain summits. The air is very dry, especially in winter. Insolation is strong. Low shade temperatures can be easily endured owing to the strong sunshine, dry air and low wind velocity. The mean annual precipitation is 36 inches, the minimum coming in winter. R. DEC. W.

OCEANIA.

CORAL REEFS OF THE GREAT BARRIER, QUEENSLAND.—A paper under this title, read at the Adelaide meeting of the Australasian Association for the Advancement of Science in January, 1907, is a study of the structure, life distribution, and relation to the mainland physiography of the coral reefs of the Great Barrier by C. Hedley of the Australian Museum, Sydney, and T. Griffith Taylor, of the Geological Department, University of Sydney, based upon their studies in 1906 during a visit to the reefs near Cooktown. The authors present definite traverses across three reefs in various and progressive stages of growth, showing the superficial geological structure and distribution of life. These observers favour the Darwinian view of coral growth.

Summarizing the results of their studies, they show that the growth of an individual reef proceeds in a regular cycle. If the reef reaches the surface with its axis along the wind, then its shape endures; but if across the wind, then its extremities are produced backward, forming first a crescent, later a horseshoe, and finally an oval, thus enclosing a lagoon. Subsidence at this stage arrests development or rejuvenates the reef. In quiescence, the lagoon walls broaden, the lagoon is obliterated with sediment, a vegetated sand bank spreads on the summit and the atoll, grown to a cay, has arrived at maturity.

Not every writer on the Barrier Reef Region has expressed an opinion on the question of formation during subsidence. On the Darwinian side are ranged Jukes, Kent, and Andrews, and opposed to it is Agassiz. The present observers find a verdict for the Darwinian view on these grounds: That the mainland of Queensland shows subsidence in (1) drowned river mouths, (2) the formation of its bays and islands, and (3) the sinking of an isthmus that once continued the Cape York peninsula to Papua; that the sinking of the Queensland coast is part of a general movement which affected the whole of Eastern Australia and Tasmania; probably correlated with an upward movement in the Australian interior between the 135th and 140th meridians and perhaps on the north shore of the Papuan Gulf; the Barrier trough thus ending in a valley of the Fly River; that the Barrier presents (which has been denied) a steep outward face, agreeable to the Darwinian hypothesis; that ejections from the Murray volcano show coral formation to occur there at considerable depths; and that the maturity (a term here introduced into coral geology) of the northern reefs indicates slow subsidence followed by quiescence.

THE BONIN ISLANDS.—A long paper, "Pflanzengeographische Studien über die Bonin-Inseln," by H. Hattori, docent in botany at the Imperial University at Tokyo, appears in the *Journal* of the College of Science in the University (Vol. 23, Article 10). The author says the islands have their name from the Japanese "Munin-to" (uninhabited islands), but they are commonly known in Japan as "Ogasawara-shima," after their discoverer, Ogasawara Sadayori, who in 1593 was driven ashore on those islands. Many products of the islands were taken to Japan by later visitors, but the trade soon came to an end, as the coast was dangerous and many vessels were shipwrecked there. The archipelago consists

of more than twenty large and small islands and lies between 26° 32′ and 27° 43′ N. Lat. and 142° 6′ and 142° 14′ E. Long., almost in a straight line from north to south. There are in the chain three groups from north to south, in the western edge of Polynesia. The islands are covered with high and low mountain chains, their coasts are high, rugged, and deeply indented, and offer scarcely a single harbour where a ship may lie at anchor, because the rock wall falls almost precipitously to the sea. Only Futami, in the northern part of Chichi-shima in the middle group, is adapted for the anchorage of large vessels, and it is the best haven among the islands.

The Japanese long used the islands as a penal colony, but in 1861 settlers were sent to them, and in 1876 Japan established a colonial government there. All the islands are of volcanic origin, formed in the Eocene period of the Tertiary, as was shown by nummulitic enclosures. The volcanic soil favours the production of the banana, pineapples, and sugar cane, which are the chief crops. The average temperature is 22.1° C., and only in the three months from January to March does it fall a little below 20° C. The average rainfall is 1,379.9 mm., the wet period extending from June to September, and the dry season from January to April. Fifty-four pages are given to a description of the flora and its affinities with the vegetation of other island groups. The monograph is illustrated with photographs.

POLAR.

MR. LEFFINGWELL'S PLANS.—Letters received from Mr. Ernest DeKoven Leffingwell, *via* Point Barrow, announce his change of plans for the season and his early departure for San Francisco, where he will probably arrive on one of the whaling vessels about Nov. 1.

His intention was to remain another year at Flaxman Island, and supplies and dogs were forwarded by Mate Storkersen, last summer. When it became evident that his work could not be completed during the next year, he decided that it would be best to return and "refit" for a longer period. Special instruments were wanted for the work which he finds to do, and there seemed to be need of consulting the Department in Washington.

He has already explored several rivers never before seen by white men, and mapped one or two hundred miles of the coast heretofore not accurately given. His headquarters remain at Flaxman Island. His address in San Francisco, where letters may be received from him as early as Nov. 1st, is care of the Wells-Fargo Express Company.

NEWS FROM MR. STEFANSSON.—The Society has received three letters from Mr. Stefansson, the ethnologist, in which he gives particulars of the conditions this summer on the Arctic coast of America and of some changes in his plans which circumstances have necessitated. Writing from Fort McPherson (on Peel River, near the head of the Mackenzie delta), on July 15, he said that he had secured two whaleboats and a sufficient outfit of dogs and some other supplies. He and his companion, Dr. Anderson, crossed Slave Lake June 24, ten days after the ice broke into cakes, and reached Fort McPherson July 6. He intended to start July 16 with a whaleboat and one native down the delta for Herschel Island, and Dr. Anderson, meanwhile, would use the other boat along the river and coast between

Fort McPherson and Herschel Island, stopping, now and then, to make zoological collections.

The other letters, dated Herschel Island and Point Barrow, Alaska, announce unusual delay in the arrival of the whaling fleet. On Aug. 15, the whalers had not arrived at Herschel Island and it was feared they were not coming this year. The prevailing winds kept the ice hugging the coast, though there was room enough for a whaleboat along the shore.

Mr. Stefansson found that last winter was unusually mild everywhere north of Bear Lake, along the Mackenzie, but the spring was very cold, and from about Lat. 62° to the ocean Messrs. Stefansson and Anderson were never out of sight of snow-flecked mountains. The ice around Herschel did not allow ship navigation till the middle of July.

Mr. Stefansson had expected to replenish his stock of matches and obtain some other supplies from the whalers, and their non-arrival made it necessary for him to go west along the coast to Point Barrow, in the hope to secure there what he required. He started Aug. 14 by whaleboat but was picked up on the 15th by the whaler *Karluk,* which had wintered at Herschel Island, and was going home. At Flaxman Island Mr. Leffingwell came aboard to leave the Arctic, where he has now spent two years.

After reaching Point Barrow on Aug. 23, easterly winds set in, the coast was soon cleared of ice and the whaling fleet, which had been stopped at Icy Cape, 150 miles to the west, came in. Dr. Anderson and three of the natives whom Mr. Stefansson had employed, followed him towards Point Barrow with two other boats.

As circumstances had compelled Mr. Stefansson to travel far to the west, he was obliged to give up his plan of spending the coming winter among the Eskimos in Coronation Gulf, east of the Mackenzie River. But his scheme of study also included the Eskimos living inland along the Colville River to the southeast of Cape Barrow.* He therefore intended to make every effort to reach these natives. He had secured at Point Barrow and from the arriving whalers four tons of supplies. Thus fitted out for two years, he expects to be able next year to act independently in case the ships again fail to penetrate Beaufort Sea. He has chartered a sailing sloop of four tons to take his supplies eastward. Storkersen, formerly mate of the *Duchess of Bedford,* has joined his party. Whether or not he may be able to reach the Colville River Eskimos and spend the approaching winter with them, he expects, in the spring, to be digging for Eskimo remains to the east of the mouth of the Colville, and Storkersen will go to Point Barrow to ship whatever specimens are collected before the party journeys east to endeavour to reach the natives of Coronation Gulf.

Mr. Stefansson also writes that hunting was very poor last winter along the coast between the Mackenzie River and Flaxman Island. The average number of deer killed per year has varied from 4,000 to 10,000, but this year probably less than 400 were slaughtered, not enough to feed the native population of about 300. Seals also were scarce, and the people might have suffered severely if the steamer *Karluk* at Herschel island had not supplied some food. There was probably no scarcity of food east of the Mackenzie, for the coast is a good food district, fish, seals, white whales, and caribou being plentiful.

News from Commander Peary.—Mr. Herbert L. Bridgman, secretary of the Peary Arctic Club, received, late in September, a letter from Commander Peary,

written from Etah on the coast of west Greenland, a little southeast of Smith Sound. He reached Cape York, on the north side of Melville Bay, on July 31, and sent his vessel, the *Roosevelt*, on to Etah to overhaul and trim for the ice. With his attending steamer, the *Erik*, he visited a number of Eskimo settlements to obtain natives, dogs and material for his northern journey. Thirty-five walrus were killed for dog food. His party on the *Erik* rejoined the *Roosevelt* at Etah on Aug. 11. The coal supply of the *Roosevelt* was then replenished from the *Erik* and stores were landed for the relief of Dr. F. A. Cook, who had not yet returned from his northern trip. The weather was unusually stormy, but though it was snowing hard when Mr. Peary wrote, no ice had yet formed. Plenty of snow to the north could be seen from Littleton Island. The success of the journey through the Smith Sound channels depended, of course, upon the ice conditions. All on board were well.

A despatch from Captain S. W. Bartlett, commander of the *Erik*, dated "Indian Harbor, *via* Cape Race, N. F., Sept. 26," says that the *Roosevelt* left Etah for the north on Aug. 17 with good prospects. On her return voyage, the *Erik* collided with an iceberg and was badly damaged.

Supplies for the British Antarctic Expedition.—According to the London *Times*, preparations have been in hand for some time in England and New Zealand for sending supplies and equipment to Lieut. Shackleton and his comrades who spent the past Antarctic winter in McMurdo Sound, Victoria Land. It is supposed that they began their sledge journeys to the south, east, and west, early in October. The supplies were shipped from London and Liverpool to New Zealand where they will be loaded on the *Nimrod* at Lyttelton, together with meats, butter, cheese, woollen goods, etc., procured in New Zealand. The *Nimrod* will start for the Antarctic on Dec. 1. The food supplies will be sufficient for thirty-eight men for a year, and if the party is frozen in so that it cannot return home at the end of the summer's work, it will have sufficient food till a relief vessel reaches it. It is hoped that the *Nimrod* will return to Lyttelton with news from the explorers in March or April next.

VARIOUS.

A "List of Works relating to Deep Waterways from the Great Lakes to the Atlantic Ocean with Some Other Related Works," including books, articles in periodicals, and United States documents, has been compiled under the direction of A. P. C. Griffin and issued from the Government Printing Office.

The Coast and Geodetic Survey has just issued a supplement to its List and Catalogue of Publications covering the period, January, 1903, to Aug., 1908. The list and catalogue are now complete from 1816 to August of this year.

Prof. C. H. Hitchcock, of Dartmouth College, expected to leave for Hawaii on Oct. 1st. He will complete his book upon the Hawaiian volcanoes while there. The work is to be published by the Hawaiian Gazette Company of Honolulu.

A MONUMENT TO HERMANN VON WISSMANN, the German African explorer, was unveiled at Lauterberg in the Hartz Mountains early in September.

DR. A. PENCK of the University of Berlin will lecture at Yale, Harvard and Columbia Universities this winter, and will take a journey around the world at the conclusion of his work in this country.

A MAP OF THE CONGO INDEPENDENT STATE in twelve sheets, on a scale of 1:1,000,000, has just been published by Justus Perthes, Gotha.

MR. S. PERCY SMITH has translated from the French the account of Captain Dumont D'Urville's exploration of Tasman Bay, New Zealand, in 1827 and the translation has been published in the *Transactions* of the New Zealand Institute (Vol. 40, 1907).

ACCORDING TO THE *Lancet*, Prof. Krämer, senior staff-surgeon in the German navy, has been appointed to the charge of the scientific expedition now being fitted out for the Antarctic Ocean.

TO MARK THE COMPLETION of the fiftieth year of the Geologists' Association, London, in November next, it is proposed to issue a volume dealing with the geology of the districts of England and Wales visited by the Association since its foundation. The book, edited by Messrs. H. W. Monckton and R. S. Herries, and illustrated with maps and sections, will, it is hoped, be ready before the end of the year.

THE COLONIAL JOURNALS now multiplying in various parts of Africa are becoming one of the best sources of information concerning the development of these newer regions of the world. Conspicuous among them is the *Deutsch-Ostafrikanische Zeitung*, a quarto filled with information and news relating to German East Africa. It is now issued twice a week and has recently enlarged its department of commercial information, which it distinguishes from the other matter by printing it in Latin instead of German characters.

THE PRESS BULLETIN of the U. S. Geological Survey says that automobile tourists are beginning to find the topographic maps of the Survey invaluable in laying out routes of pleasure travel. Tourists have learned that public roads, as well as all important private roads, are shown on these maps, while the contour lines indicating the topography and showing the grades of the roads enable the automobilist to determine accurately the character of the country through which he intends to travel.

OBITUARY.

PROF. DR. AUREL KRAUSE.—Dr. Krause died in Gross Lichterfelde near Berlin March 11, 1908, aged 60 years. He was sent with his brother Arthur by the Bremen Geographical Society in 1881-82 to Alaska and the neighbouring peninsula of Asia for scientific exploration. His geographical reports were published

in the fourth and fifth volumes of the DEUTSCHE GEOGRAPHISCHE BLÄTTER and the results of his ethnographical studies appeared in his book "Die Tlinkit-Indianer," issued in 1885.

ENRIQUE A. S. DELACHAUX.—We regret to receive from the Museo de La Plata the announcement of the death, on the 10th of April last, of Sr. Delachaux, head-master of the School of Geography and Drawing in the Museum.

NEW MAPS.

AFRICA.

CONGO INDEPENDENT STATE.—Carte des Concessions Minières de l'État Indépendant du Congo. Scale, 1:8,000,000, or 126.2 statute miles to an inch. Supplement to *Le Mouvement Géog.*, Vol. 25, No. 32, Brussels, 1908.

Shows in colours the areas in which seven different companies have held mining concessions. Supplements an article, "Les Concessions Minières au Congo."

CONGO INDEPENDENT STATE.—Carte du Katanga. Scale, 145 miles to an inch. *Le Mouvement Géog.*, Vol. 25, No. 31, Brussels, 1908.

A black map showing railroads constructed, building, or projected, portage routes, and the areas conceded to commercial or mining companies and those which have been retroceded to the State. Illustrates a paper, "Histoire de la Découverte et de l'Occupation du Katanga de 1883 à 1908," by A. J. Wauters.

GERMAN EAST AFRICA.—Eisenbahn- und Baumwollkarte von Deutsch-Ostafrika. Scale, 1:7,000,000, or 110 statute miles to an inch. *Koloniale Zeitsch.*, Vol. 9, No. 19, Berlin, 1908.

TOGO.—Eisenbahn- und Baumwollkarte von Togo. Scale, 1:3,200,000, or 50 statute miles to an inch. *Kol. Zeitsch.*, Vol. 9, No. 19, Berlin, 1908.

These maps show railroads in operation, those in construction, or planned, areas in cotton cultivation, places where cotton is ginned, and schools where the cotton industry is taught.

TOGO.—Karte von Togo. Scale, 1:200,000, or 3.1 statute miles to an inch. Sheets, C2 (Sokodé. Second revised edition); B1 (Jendi); A1 (Sansane-Mangu). *Mitteilungen* aus d. Deutsch. Schutzg., No. 3, Berlin, 1908.

These are sheets 7, 8, and 9, of the map of Togo on the scale of 1:200,000, which is now nearing completion.

CAMEROONS.—Expedition Hassert und Thorbecke. (1) Itinerar von Abmarsch von Soppo bis zur Ankunft in Dschang. Dec., 1907--March, 1908. Scale, 10.5 statute miles to an inch. (2) Reisewege von Dschang bis Bamenda. Scale, 7.89 statute miles to an inch. *Mitt.* aus d. Deutsch. Schutzg., No. 3, Berlin, 1908.

Black sketch maps illustrating two further reports on the geographical expedition of Profs. Hassert and Thorbecke.

GOLD COAST.—Gold Coast. Scale, 1:125,000, or 1.9 statute miles to an inch. Sheets, 72-K-111 (Obuasi), 72.-P-IV (Prestea), 73-C. IV (Dsoje). Published

under the direction of Major F. G. Guggisberg, R.E., Director of Surveys, London, 1907. Selling agents, W. and A. K. Johnston, Edinburgh and London, and Edward Stanford, London. (Price, 2s. a sheet.)

TRANSVAAL COLONY.—Route Map to Illustrate Reconnaissance of Western Zoutpansberg District. Scale, 1:480,000, or 7.5 statute miles to an inch. Supplements "Report on a Reconnaissance of the Northwestern Zoutpansberg District," by T. G. Trevor, E. T. Mellor, with introduction by H. Kynaston, Director Geological Survey. Transvaal Mines Department, Pretoria, 1908. (Price, 2s. 6d.)

The routes by ox waggon are shown in red. Shows the distribution of the copper and coal prospects described in the text.

AMERICA.

U. S. GEOLOGICAL SURVEY MAPS.

UNITED STATES.—(1) Map of Elkhorn Coal Field, Kentucky. Scale, about one statute mile to an inch. (2) Map of Russell Fork Coal Field, Virginia. Scale, 1 statute mile to an inch. *Bull.* 348. "Coal Resources of the Russell Fork Basin in Kentucky and Virginia," by Ralph W. Stone. *U. S. Geol. Survey,* Washington, 1908.

Neither map has coordinates. No. 1 is a black sketch map locating coal openings, roads, and trails. No. 2 shows hydrography in blue, contours, and coal openings in red, and the coal areas in stipple and other shading.

UNITED STATES.—St. Marys River, Mich. West Neebish Channel. Showing positions of aids to navigation. Scale, 1:40,000, or 0.6 statute mile to an inch. U. S. Lake Survey Office, Detroit, 1908.

The limits of 6, 12, 18, and 20-foot depths are indicated by corresponding curves and these water areas are tinted blue.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Pacific Ocean, October, 1908.

It is stated on the reverse that the U. S. Naval Wireless Telegraph Stations on the Atlantic and the Pacific seaboard are now supplied by the Hydrographic Office with the latest information relating to the presence of dangerous obstructions to navigation, to be transmitted to vessels at sea. Wireless messages are sent broadcast, three times a day, at intervals of eight hours, by the stations supplied with them.

Pilot Chart of the North Atlantic Ocean, October, 1908.

The reverse has a chart of the North Atlantic, illustrating recent additions to our knowledge of ocean currents obtained through floating bottles, with explanatory letterpress. This is the tenth chart of the kind that has been printed on the face or back of the North Atlantic Pilot Charts since November, 1890; the last previous one having appeared in July, 1901. The chart shows the supposed approximate routes of 146 bottles. In laying down the routes of many of them regard has been paid to the course of others recovered in earlier years at intervening points. The individual drifts as laid down on the chart do not necessarily

represent the actual surface currents of the ocean, but the resultant effect of all the forces to which the bottle was exposed during its drift. Taken collectively, the paths followed by the bottles give a fair idea of the drift currents of the North Atlantic.

In the equatorial and tropical regions where the trade winds prevail, the direction of the drift is westerly, as the chart shows, all the drift bottles finding their way to the Windward Islands, the Bahamas, or the shores of the Caribbean or Gulf of Mexico. North of the 40th parallel, the direction is easterly or ENE, owing to the prevailing westerly winds. Between these two main drifts and extending in latitude between 25° and 40° N. and in longitude from 30° to 60° W., is a debatable region, crossed by numerous sailing and steamship routes, where the many bottle papers set adrift have been rarely recovered, only eight of them having been found since 1888.

Accompanying the chart is a table giving the name of each vessel and the time and geographical position of throwing each bottle overboard, the date and position of recovery, the days intervening between the commencement of the drift and the date of recovery, the length of the total drift and the average drift per day. No allowance is made under the column headed "Average drift per day" for the time during which the bottle may have lain undiscovered on the beach, and the given average drift per day is thus in most cases less than the actual drift. Each bottle route is numbered to correspond with the number in the table.

CANADA.—The Society has received from the Minister of the Interior, Ottawa, Canada, the following maps, contained in pocket, in the volume "Canada's Fertile Northland" (to be reviewed), published by the Department in 1907:

Map of the Dominion of Canada. Scale, 1:6,336,000, or 100 statute miles to an inch.

Shows in red 14 localities where wheat has been grown betwen the 54th and 62nd parallels, north of the present wheat area; also, the steamer route from Fort Churchill through Hudson Bay and Strait to the Atlantic. An inset gives particulars of the growing of wheat north of the present wheat belt.

Northern Canada. Scale, 25 miles to an inch.

Includes Alberta, Saskatchewan and the southeastern part of the Northwest Territories. The agricultural prospects of many areas are indicated in red text scattered over the map.

Atlas of Canada. Minerals. Scale, 1:6,336,000, or 100 statute miles to an inch.

This is a reprinting of sheets 6 and 7 of the Atlas of Canada showing the distribution of metals and minerals as far north as the Arctic Circle.

Northeastern Canada. Scale, 1:2,217,600, or 35 statute miles to an inch.

The map is especially designed to show in fathoms the numerous soundings throughout Hudson Bay as far north as Southampton Island and Hudson Strait and the nature of the sea bottom.

Meteorological Maps of Canada.

A series of 20 maps on one sheet showing average, possible hours of sunshine in the summer months, temperatures, isotherms, precipitation, snowfall and isobars.

CANADA.—Standard Topographical Atlas, sheet 29 (Lake Nipigon, Thunder

Bay district). Scale, 1:500,000, or 7.89 statute miles to an inch. Department of the Interior, James White, Geographer, Ottawa, 1907.

CANADA.—Standard Topographical Atlas. Sheet 9 N. W. (Timiskaming Sheet). Scale, 1:250,000, or 3.95 statute miles to an inch. Department of the Interior, James White, Geographer, Ottawa, 1908.

Embraces the Nipissing district, Ontario, and Pontiac Co., Quebec.

BRAZIL.—Carte Hypsométrique de l'État de St. Paul. Scale, 1:2,500,000, or 39.4 statute miles to an inch. *Annales de Géog.*, No. 94, Armand Colin, Paris, 1908.

Illustrates a paper by Mr. Pierre Denis, "L'État de Saint-Paul, d'après les Travaux de la Commission Géographique." Since 1886 the Geographical and Geological Commission of São Paulo has been making a detailed topographic survey of the State, which has now been completed for the eastern part. In 1899, the first two sheets of the map based upon these surveys were published and seventeen more have since appeared. The scale is 1:100,000, the sheets are produced in colours and the contour interval is 25 meters. This scientific work is excellently generalized in the above map. Six tints are used to show relief. The surveys of rivers flowing westward to the Rio Paraná and published by the Commission on a scale of 1:50,000 are used as the basis for mapping the western part of the State. The map presents a good small scale picture of the physical features of São Paulo.

BRAZIL.—Planta do Rio Ribeira de Iguape e Seus Affluentes. Scale, 1:50,000, or 0.7 statute mile to an inch. Ten sheets. Commissão Geographica e Geologica do Estado de S. Paulo, São Paulo, 1908.

This is the latest of the fine maps illustrating the reports of the Commission on the exploration and survey of the larger rivers of São Paulo. The large scale of the map sheets makes it possible to give all details relating to the river and its more important tributaries. The sheets include cross sections, showing the forms of the river bed and also longitudinal profiles. The descriptive letterpress is illustrated by many fine photographs.

PERU.—Croquis de la Region Fluvial Peruana del Yuruá-Purús-Madre de Dios-Beni. Scale, 1:2,000,000, or 31.56 statute miles to an inch. *Bol.* de la Sociedad Geog. de Lima, Vol. 21, No. 3, Lima, 1907.

Illustrates a paper on these rivers by Dr. Carlos Larrabure y Correa. The boundary claimed by Peru under the interpretation of its colonial titles is shown in red.

ASIA.

CHINA.—Plan of Tungting Lake. Scale, 4.70 miles to an inch. Imperial Maritime Customs. *Trade Reports*, 1907, Vol. 2, Yangtse Ports; Shanghai, 1908.

Shows the channel through the lake used by Yangtse steamers.

CHINA.—Plan of Nanking. Scale, 1,800 feet to an inch. Imperial Maritime Customs. *Trade Reports*, 1907, Vol. 2, Yangtse Ports; Shanghai, 1908.

An inset shows on a scale of 830 feet to an inch the termini of the Nanking-

Shanghai R.R., now completed, at the ferry across the Yangtse and at the city wall. The railroad does not enter the walled city.

China.—Plan of Chinkiang Harbour, showing Harbour Limits, Anchorages, Jetties, Hulks, etc. Imperial Maritime Customs. *Trade Reports*, 1907, Vol. 2 Yangtse Ports; Shanghai, 1908.

Philippine Islands.—Verteilung der Niederschläge und mittlere Teifunbahnen auf den Philippinen. Scale, 1:7,500,000, or 118.35 statute miles to an inch. Von Wilhelm Krebs. *Deutsche Kundschau für Geog. u. Stat.*, Vol. 30, No. 12, Vienna, 1908.

Supplements a paper, "Die Niederschlagsverhältnisse der Philippinen," by Mr. Krebs. The position of each of the sixty-four rain stations is indicated and the average amount of precipitation is shown in tints of green. Arrows give the directions taken by typhoons at different periods of the year. Based upon publications of the Philippines Weather Bureau.

AUSTRALASIA.

New Zealand.—Sketch Map Showing Portions of the Southern Alps of New Zealand. Scale, 1:125,000, or 1.97 statute mile to an inch. Supplements paper, "The Douglas Glacier and its Neighbourhood," by James Mackintosh Bell. *Geog. Jour.*, Vol. 32, No. 2, London, Aug., 1908.

A black map showing the distribution of the glaciers in this almost inaccessible part of the Southern Alps.

EUROPE.

Germany.—Pflanzengeographische Karten aus Sachsen. Three sheets. 1, Weinböhla; 2, Zschirnsteine; 3, Altenberg. Scale, 1:25,000, or 0.39 statute mile to an inch. By Prof. Dr. Oskar Drude. *Mitt.* des Vereins für Erdkunde zu Dresden, No. 7, Dresden, 1908.

These fine maps illustrate an article by Prof. Drude. The various forms of vegetation are clearly represented by colours and other symbols.

Germany.—Höhen- und Gewässer-Karte des Rheinstromgebietes. Scale, 1:1,200,000, or 18.93 statute miles to an inch. Supplements the Report "Untersuchung der Hochwasserverhältnisse im Deutschen Rheingebiet," No. 8, "Der Abflussvorgang im Rhein," bearbeitet von Dr. M. von Tein. Zentralbureau für Meteorologie und Hydrographie im Grossherzogtum Baden. Wilhelm Ernst & Sohn, Berlin, 1908.

Eleven tints are used on this fine map, in addition to contour lines, to show relief. The distribution of firn and glaciers is given. Waters rising to the northwest of Lake Geneva reach the Rhine through the Aare River. The map and the exhaustive paper which it accompanies are a fine contribution to our acquaintance with the hydrographic conditions in the Rhine basin.

OCEANIA.

The Caroline Islands.—One sheet, including 3 maps and a profile, *viz:* (1) Karte von Babeldaob (Pelau Inseln) nach provisorischen Aufnahmen. Scale,

1:225,000, or 3.5 statute miles to an inch; (2) Politische Übersichtskarte der Yap-Inseln. Scale, 1:150,000, or 2.38 statute miles to an inch; (3) Ngardok See (Pelau Inseln); (4) Profil des Gamedu-Stufenberges, bei Ngabuket (Pelau-Inseln), *Mitt.* aus d. Deutsch. Schutzg., No. 3, Berlin, 1908.

These maps are by Prof. Dr. Augustin Krämer and illustrate an article, "Studienreise nach den Zentral- und Westkarolinen," on his explorations in the Carolines last year. The nomenclature on No. 2 includes new names ascertained by Dr. Krämer.

BONIN ISLANDS.—Die Karte der Bonin-Inseln. Scale not given. *Journal* of the College of Science, Imperial University of Tokio, Japan, Vol. 23, Article 10, Tokio, 1908.

Illustrates a monograph by Mr. Hattori "Pflanzengeographische Studien über die Bonin-Inseln."

POLAR.

ARCTIC.—Preliminary Map of Prince Charles Foreland. Scale, 1:250,000, or 3.94 statute miles to an inch. From surveys by W. S. Bruce, 1906-7. *Geog. Jour.*, Vol. 32, No. 2, August, 1908.

Supplements a paper by Captain Bruce. Prince Charles Foreland, a long narrow island off the coast of West Spitzbergen, though discovered more than three centuries ago, was almost entirely unknown until visited in 1898 and 1906 by the Prince of Monaco. This product of Captain Bruce's surveys may well take the place of the earlier inaccurate charts. The surveys, however, were not completed and about one-third of the coast line is indicated by a broken line.

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JULY–SEPTEMBER, 1908.

AFRICA.

BLYDEN, EDWARD WILMOT.—African Life and Customs. Reprinted from the *"Sierra Leone Weekly News."* London, C. M. Phillips. 1908. 8vo. [*Gift.*]

MASPERO, G.—Les Contes Populaires de l'Égypte Ancienne. Traduits et Commentés par ——. Paris, Maisonneuve et Cie. 1882. 12mo. (*Les Littératures Populaires de Toutes les Nations, Tome IV.*) [*Gift.*]

PASSARGE, S.—Die Buschmänner der Kalahari. Mit 2 Tafeln, 24 Abbildungen im Text und 1 Karte. Berlin, Dietrich Reimer (Ernst Vohsen). 1907. 8vo.

PETERS, CARL.—Ophir. Nach den neuesten Forschungen. Berlin, Emil Felber. 1908. pr., 8vo. [*Gift.*]

AMERICA.

AMERICAN HISTORY, EARLY.—Original Narratives of. (Reproduced under the auspices of the American Historical Association. General Editor, J. Franklin Jameson.) New York, Charles Scribner's Sons. 1907-1908. 8vo:

Voyages of Samuel de Champlain, 1604-1618. Edited by W. L. Grant. With Map and two Plans;

Narratives of Early Virginia, 1606-1625. Edited by Lyon Gardiner Tyler. With Map and two Facsimiles;

Bradford's History of Plymouth Plantation, 1606-1646. Edited by William T. Davis. With Map and three Facsimiles;

Winthrop's Journal, "History of New England," 1630-1649. Edited by James Kendall Hosmer. With Maps and Facsimiles. 2 volumes.

BECK, LOUIS J.—New York's Chinatown. An Historical Presentation of its People and Places. Illustrated. New York, Bohemia Publishing Co. (1898.) 8vo.

CHADWICK, EDWARD MARION.—The People of the Long House. [Illustrations.] Toronto, The Church of England Publishing Co. 1897. 8vo.

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Tibet. (Charts and Plates.) Published under the Government of India. Calcutta, Sup't Gov't Printing. 1907. 4to. [*Gift.*]

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DIELS, L.—Die Pflanzenwelt von West-Australien südlich des Wendekreises. Mit 1 Vegetations-Karte, 82 Figuren im Text, 34 Tafeln nach Original-Aufnahmen von Dr. E. Pritzel. Leipzig, Wilhelm Engelmann. 1906. (*Die Vegetation der Erde. Sammlung Pflanzengeographischer Monographien. Herausgegeben von A. Engler und O. Drude. VII.*)

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CEYLON, Agricultural Map of Northern Province. *Scale* 4 miles to 1 inch. *Size* 28 x 24 inches. Colombo, Survey Department, No. 4, 1908. Varnished and mounted as wall-map. [*Gift from the Surveyor General, Colombo, Ceylon.*]

[CEYLON.] COLOMBO, City of. Printed and Published under the orders of Hon'ble Mr. P. D. Warren, F.R.G.S., etc., Surveyor General. Ceylon, July, 1907. *Scale* 16 chains to an inch. *Size* 23 x 36 inches. Varnished and mounted as wall-map. [*Gift from the Surveyor General, Colombo.*]

[DENMARK.] ODENSE-FJORD. *Scale* 1:20,000. *Size* 25 x 38½ inches. Chart Nr. 215, Kongelige Danske Sokort-Arkiv, Köbenhavn, 1907. [*Gift.*]

[DENMARK] Store-Baelt. *Scale* 1:70,000. *Size* 25¼ x 36 inches. Chart Nr. 220, Kongelige Danske Sokort-Arkiv. Köbenhavn. 1908.

[GERMANY] REISE- UND EISENBAHNKARTE VON DEUTSCHLAND. C. Opitz. *Scale* 1:2,000,000. *Size* 24 x 20 inches. [With 40 pp.] Alphabetisches Verzeichnis. [Map folded in 8vo paper cover.] [*Gift.*]

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[ICELAND, NORTH COAST.] Steingrimsfjordr. *Scale* 1:20,000. *Size* 30 x 18 inches. Chart Nr. 217, Kongelige Danske Sokort-Arkiv. Köbenhavn. 1907.

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[VIRGIN ISLANDS.] ST. THOMAS HAVN. *Scale* 1:6,000. *Size* 31 x 28 inches. Chart Nr. 218, Kongelige Danske Sokort-Arkiv. Köbenhavn. 1907. [*Gift.*]

[GLOBE.] Britanniarum Regi Augustissimo | Georgio Tertio | Astronomorum Patrono Munificentissimo, celeberrimo | GLOBUM HUNC CAELESTEM Novam et Emendatiorem Coeli Imaginem, Sydera apud | Africæ Promontorium Australe nuperrimè observata, Atq. | Stellas Catalogi Flamstediani Universas, vere expri-

mentem, | Grati animi et pietatis monumentum, | D. D. Q. | Omni Cultu et officio devinctissimus | D. Adams. | Made by D. Adams, Globe Manufacturer & Mathematical Instrument Maker. Fleet Street, London. (Circumference 57 inches. Mounted on mahogany pedestal; full brass circle, with degrees Analemma.) [*Gift from Mrs. Thomas J. Byrne, New York.*]

[GLOBE.] Britanniarum | Regi Augustissimo | Georgio Tertio | Scientiarum Cultori pariter et Præsidio | GLOBUM HUNC TERRESTREM | Omnes hactenus exploratos terrarum tractus, Ad | observationes Navigantium Itinerantium et Astronomo | rum, recentiores accuratissimè descriptos exhibentem | Grati animi et pietatis monumentum | D. D. Q. | Omni cultu et officio devinctissimus | D. Adams | Made by D. Adams, Globe Maker to the King, Inst. Maker to His | Majesty's Ordnce and Optician to H. R. H. the Prince of Wales. | No. 60 Fleet St. London. | 1797. (Circumference 57 inches. Mounted on mahogany pedestal; full brass circle.) [*Gift from Mrs. Thomas J. Byrne, New York.*]

VARIOUS.

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ARLDT, THEODORE.—Die Entwicklung der Kontinente und ihrer Lebewelt. Ein beitrag zur Vergleichenden Erdgeschichte. Mit 17 Figuren und 23 Karten. Leipzig, Wilhelm Engelmann. 1907. 8vo.

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BOOK NOTICES.

The Complete Mountaineer. By George D. Abraham. xv and 493 pp., 75 Illustrations, Glossary of Mountaineering Terms, and Index. Doubleday, Page & Co., New York, 1908. (Price, $4.50.)

Several good works have been written on the art of mountaineering and the acquirement of proficiency in it. This volume will take its place among the best on the subject. The first part (111 pp.) giving the history and technicalities of the sport, is in its practical aspects the most interesting and valuable part of the work. It has chapters on the early mountaineers, modern mountaineering, equip-

ment and hints to beginners, the art of rock-climbing, snow craft, climbing with and without guides, and the dangers of mountaineering. As far as the art of mountain-climbing can be learned outside the field of practical experience this part of the book embracing the latest ideas and suggestions will be especially helpful to all beginners.

In Part II (115 pp.) the story of mountaineering in Great Britain is told and the characteristics of climbing among the various mountains of the kingdom are described. The pictures and text seem to show that the Briton need not go outside of North Wales to find some of the toughest of rock-climbing. Part III (210 pp.) gives a similar discussion of mountaineering in the Swiss, Italian, French, and Austrian Alps. The full-page photographs are very fine and include some striking views of rock-climbing.

Chinesisch-Turkestan. Geschichte, Verwaltung, Geistesleben und Wirtschaft. Von Prof. Dr. Martin Hartmann. viii and 115 pp., 2 Maps, and Index. Gebauer-Schwetschke, Halle, a. S., 1908. (Price, M. 3.50.)

This is one of a series of books on applied geography issued by the Gebauer-Schwetschke publishing house. It concisely treats the history of Chinese Turkestan, the peoples who inhabit it, the nature of its government, the languages of the Kashgarians, religion (Mohammedan) and foreign missionary activity, the songs and literature of the people, commerce and prospects of development. References in the text relate to copious notes filling the last third of the book, in which further information and explanatory material are supplied. The work will tend to widen knowledge of this little known land, and it is to be commended as one of the best popular sources of information.

Deutsche Politik. Die Besiedelung des deutschen Volksbodens von Ernst Hasse. pp. 156. München, J. H. Lehmann's Verlag, 1905.

The author, who is widely known in University and political circles, has attempted in this monograph to defend a principle in German politics which he believes to be vital to the continued prosperity of the Fatherland. Here we have a plea against the loss to other folk of territory, once German, *e. g.*, of East Prussia to the Poles; here is argument for the re-Germanizing of territory once German; for a political policy which supports the dictum, Germany for the Germans. Or, to quote Treitschke's sentiments as the author does, "the name Germany as applied to given territory has continually changed. The territory between the Rhein and the Elbe alone is that which can be called original German Volksterritory. That which is east and west has been subject to change. A full third of the present Empire is what may be called colonial territory, has been acquired in the years passed and has been occupied. This, in part, is being de-Germanized, to coin a word, and it is the duty of the Government to recover and to hold it." Such is the contention of Dr. Hasse and his party.

Brief consideration is given in this monograph to the historical side of the questions as to when, why, and how the Germans came to inherit the territory which as a race they now occupy. The problem, writ large, as some would have it, covers a wider field than that included within the boundaries of the German Empire. Any territory once German should remain German, though our author does not attempt to meddle in foreign politics.

In a few brief, but very suggestive, chapters we are told how the various regions of the Empire have been settled from the days of the early Teutonic migrations to the present. Around the situation in the immediate present, that is,

since the founding of the Empire, the chief import of this paper centers. Praise is expressed for the so-called anti-Polish policy of Bismarck, but the policies of his successors, it is thought, have not been sufficiently vigorous.

The law of 1886 made provision for "establishing a fund of 100 million marks for the purpose of strengthening the German element in the province of West Prussia and Posen against Polish activities and to do this through the settlement of German peasants and laborers." Land was to be purchased, and sold or leased at low figures. At some length the author undertakes to show the working of this law, giving statistics to justify his severe criticism of the lax administration of the same. In twenty years, he says, 60,000 Germans have been induced by the Settlement Commission to enter the East Mark, and more than one million have left to settle further west. This should not be, and he makes an impassioned appeal to the Emperor to give his support to the Germanizing projects.

The settlement policy, viewed as a political question, he thinks, should make the following demands: (1) That the Polish population should leave the East Mark; (2) The Poles should not be permitted to enter the region from Russia and Galicia; (3) The Germans both natives and newcomers should be induced to remain; (4) German colonists should be encouraged to enter the East Mark.

Dr. Hasse presents his case forcefully and interestingly, and one must admit there is point in his arguments. We do not have the problem in exactly the same form. E. L. S.

African Life and Customs. Reprinted from "The Sierra Leone Weekly News." By Edward Wilmot Blyden. 91 pp., and 3 Appendices. C. M. Phillips, London, 1908. (Price, 1s. 6d.)

Dr. Blyden, a negro who has been identified most of his life with Africa, and is widely known as an accomplished scholar and teacher, describes in this series of newspaper articles how the native African has developed and organized a system or code of life useful to him for all his needs. He treats in this volume of the African pure and simple, the so-called pagan of Africa, untouched either by European or Asiatic influence. He describes how the African has constructed for himself his part of the world and the "social, industrial, and economic arrangements under which, evolved in the course of centuries, he has lived and thriven, generation after generation."

The basal facts in this African life are given by Dr. Blyden as follows:

1. The Family which in Africa, as everywhere else, is the basic unit of society. Every male and female marries at the proper age. Every woman is required and expects to perform her part of the function of motherhood—to do her share in continuing the human race.

2. Property. The land and the water are accessible to all. Nobody is in want of either for work, for food, or for clothing.

3. Social life. This is communistic or co-operative. All work for each and each works for all.

4. The tribes have laws regulating every function of human life and the laws are known to all the members of the tribes, and justice is administered by the tribal chiefs in the presence of the whole people in the village or town where any violation of tribal law may have taken place. There is no need for standing armies. The whole people of the village or town are jointly and severally guardians and preservers of the peace.

The foundation of the African family is plural marriage and, contrary to the general opinion, this marriage rests upon the will of the woman, and this will operates to protect from abuse the functional work of the sex and to provide that all women shall share normally in this work with a view to healthy prosperity and an unfailing supply of population.

The volume is given to the illustration and discussion of the working out of these social principles in African life. Every page is written with the idea that it is not wise to confound the races, but that the negro in Africa should be raised

upon the basis of his own idiosyncracies. The author quotes from the writings of sociological students in Europe to show that the African system has evolved no counterpart of the "submerged tenth" in European capitals.

The book contains many ideas and much information of value, though, being written wholly from the Africa point of view, some of the opinions expressed will naturally find little indorsement among the white races.

Das Wetter und seine Bedeutung für das praktische Leben. Von Professor Dr. Carl Kassner. 8vo. Leipzig, Quelle und Meyer. 1908. Pp. 148. Illustrated. (Price, 1 mark 50 pf.)

If one may judge by the number of small text-books of meteorology published in Germany during the past few years, the popular interest in weather-study in that country must be increasing very rapidly. We already have the books of Köppen, Trabert, van Bebber and Kaegbein. Köppen has given us two books, one on marine meteorology and one on climatology, and Trabert has also given us two books, one, a small one, on meteorology and the second, a larger one, on meteorology and climatology. The most recent addition to this growing list is a useful little book by Professor Kassner, observer at the Royal Prussian Meteorological Institute in Berlin, and *Privatdozent* at the Royal Technical High School in the same city. The aim of this volume is to set forth, for the information of the average reader, (1) the historical development of weather forecasting; (2) the basis of modern weather forecasting, and (3) the relations of the weather to the every-day life of man. The subjects discussed are thus not the same as those already included in other books, and for this reason we feel that Professor Kassner has made a real contribution to meteorological literature. The section dealing with the historical development of weather forecasting summarizes briefly the results of Dr. Hellmann's investigations into meteorological folk-lore and literature, but we wish to call special attention to the third section, which is an innovation in meteorological text-books. This section deals with *Die Bedeutung des Wetters für das praktische Leben.* It is significant that so much attention is now being paid to the human relations of the sciences. In geography, anthropo-geography and ontography are becoming every day more familiar terms. In a new book on climate, the author uses the sub-title, "considered especially in relation to man."

Professor Kassner has collected and classified a considerable number of illustrations of the relation of weather conditions to the life of man; to his health, and his activities. Many of these are not new to those who have worked along these same lines, but the collection of such examples will make them generally useful to a large body of teachers and students. In view of the fact that the third section of Professor Kassner's book is somewhat unique, it is worth while to note here the principal subdivisions of the subject as given by the author. III. The Importance of Weather in Practical Life. 1. Introduction. 2. Agriculture and Forestry. 3. Trade and transportation. 4. Industries. 5. Law. 6. Influence of weather upon man and upon the life of the community, including disease, health resorts, and history. 7. The influence of man upon the weather, including deforestation and reforestation; irrigation and drainage; artificial rain; lightning protection, and hail-shooting. It will be noted that this is an interesting list of headings, and the discussion is well worth reading. We congratulate Professor Kassner upon his contribution to meteorological literature. The low price of the book (1 mark, 50 pf., bound) brings it within reach of a large number of readers.

R. DEC. W.

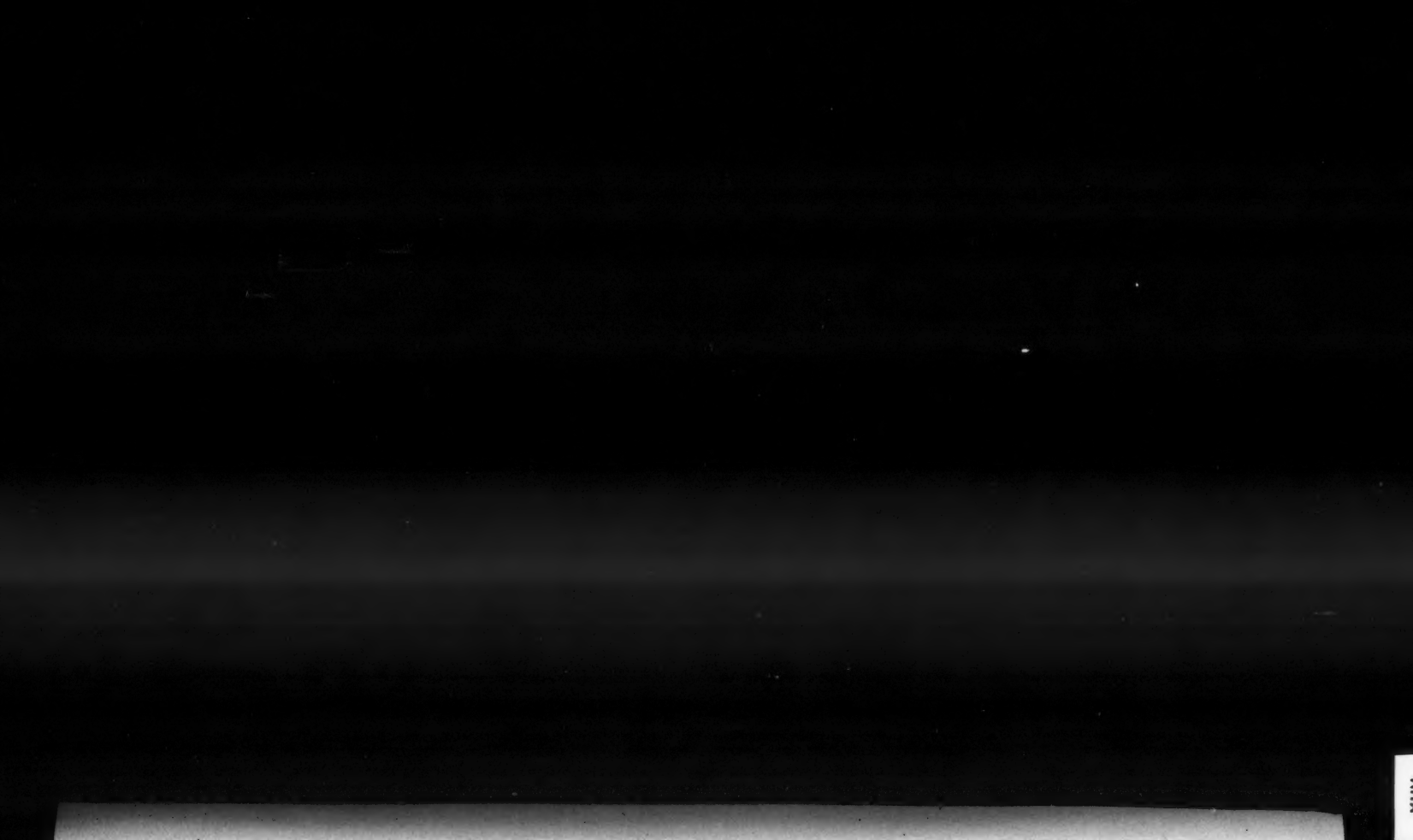
In Indian Mexico. A Narrative of Travel and Labor. By Frederick Starr. Forbes & Co., Chicago, 1908.

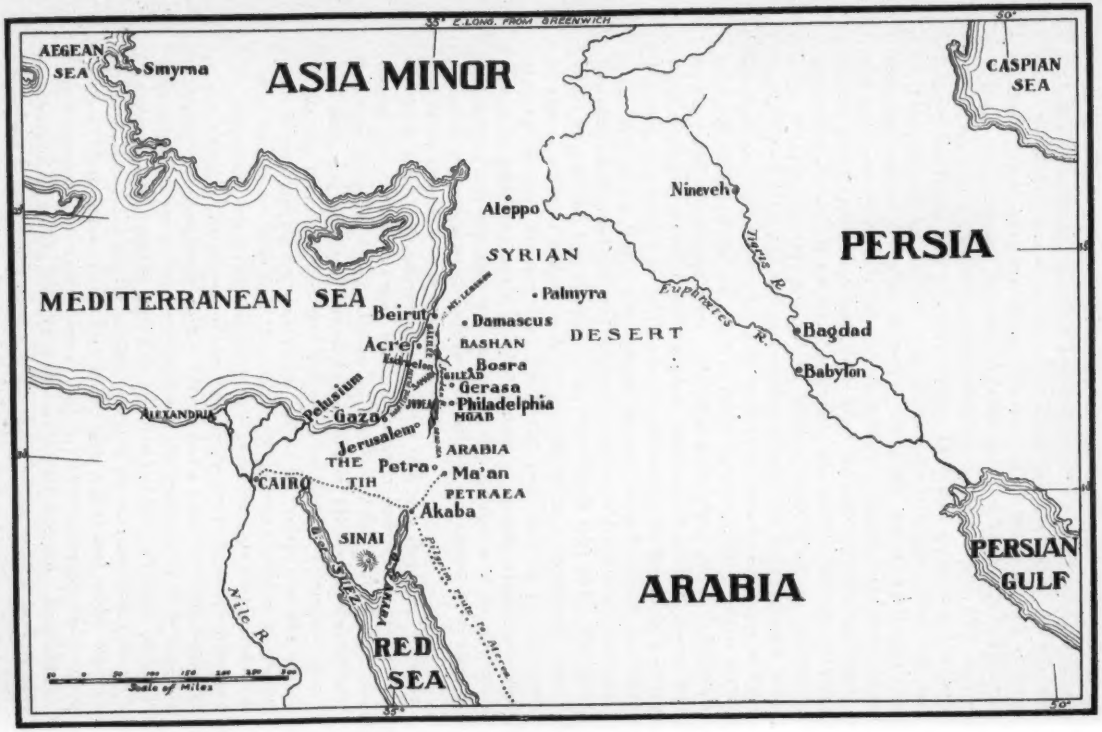
It is a pleasant task to review a book about which only pleasant things can be said. This is the case with the volume before us. Popular in the best sense of the term, modest and unassuming, it is still full of interesting and valuable information and, although the investigations carried on in Mexico and Guatemala by Mr. Starr were specifically anthropological, it is the geographical data which he gives that are of chief importance here. These data are presented in the shape of descriptions of the routes he took, of the country through which they led him, their flora and the geological formations, all equally fascinating in their truthfulness and a natural vivacity that appeals strongly to readers unacquainted with the country as well as to those who know the land from personal experience. The area which Prof. Starr traversed embraces from north of the City of Mexico to parts of Guatemala contiguous to the Mexican republic and on the coast of the Pacific. Prof. Starr has not only seen these districts, he has penetrated their characteristic peculiarities. For instance, the journey from La Esperanza to Tehuacan is so well described that the reader is fairly transported to the scenes with which he was familiar in former times. The description of the country inhabited by the Mijes is not only excellent, but to a great extent unique in accuracy and actuality. The same may be said of the chapters consecrated to Michoacan and, in short, to every part of the book. The descriptions are simple, without any attempt at flourishes which sometimes mar the effect of otherwise truthful word-pictures. The writer attracts and instructs his reader, who travels with him. The geology of Mexico, if not in its infancy, is as yet only studied in a fragmentary way. Prof. Starr has observed the rocks along his lines of travel carefully and has gathered a number of interesting details concerning them. His book, though not claiming to be anything but popular, embodies many details that will be welcome to the geologist and mineralogist from a geographical standpoint. The same may be said of his statements in regard to climate.

Fairly good illustrations accompany the text, and they are, of course, from photographs. We miss a map, which is almost indispensable in view of the intricate lines of travel. The reader not thoroughly familiar with Mexican geography may have some trouble, at first, in following Prof. Starr in his wanderings.

Having previously published the details of his anthropological study, Prof. Starr is perfectly justified in referring those of his readers who take special interest in that subject to the book. In the present volume he gives us an unpretentious but exceedingly interesting account of how he obtained his material at the various places visited. That account is very valuable to students. It furnishes them with a manual of anthropologic work in Mexico in the sense that, without exaggerating difficulties, it gives a very clear picture of the impediments to be encountered in the pursuit of such studies among the Mexican Indians even when, as was the case with the author, one has the cordial support of the Mexican authorities. No other book on Mexico gives, to our knowledge, such a clear idea of the drawbacks one has to encounter, of the facilities he may happen to enjoy, as well as of the way of handling the Indian in order to obtain the ends proposed. Here also, as in descriptions of nature and scenery, Prof. Starr is simple in style, very clear, and absolutely free from the tendency to extoll his own merits by dwelling upon hardships and personal adventure. His was an arduous task which he has successfully performed.

A. F. B.





MAP OF SYRIA AND SURROUNDING COUNTRIES.